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A Solution for the Shipping Problem

THE decision of the Attorney General of the United States, regarding the so-called Lasker-Farley plan for the disposition of the Government-owned merchant vessels, has left the Shipping Board once more at sea, exactly where it has been floundering most of the time since Congress refused to pass the ship subsidy bill. Mr. Daugherty's opinion was that the unloading of Government merchant ships on numerous private corporations in which Uncle Sam would be a considerable stockholder and, incidentally the holder of the proverbial bag, would be illegal, consequently, the Lasker-Farley plan has become a dead issue and the Shipping Board must devise some other scheme for solving its vexing problem.

What can be done?

The present method of indirect operation is both unsatisfactory and costly. The loss to the Government is at the rate of $50,000,000 a year. Moreover, Section I of the Jones Act seems not only to preclude continuous Government ownership but actually to demand that the Shipping Board vessels be sold to private owners.

The approximate value of each and everyone of these vessels is known as a result of the careful and competent survey of all Government-owned merchant ships which has recently been made. Many of the ships are commercially worthless and must therefore be scrapped. There are several responsible concerns, however, which are ready to buy certain ships and routes and, if the Government assumes a business-like attitude and agrees to terms that are fair to both sides, customers can be found for the others.

To ask a prospective buyer to pay a definite price for an article of questionable value is certainly unfair to the customer and it cannot be denied that some of the steamship routes established by the Government, if not the vessels themselves, are of questionable value. Nor is it right for the Government to turn its property over to private citizens without remuneration and proper protection against loss, but it is conceivable that it would be cheaper in the end to give away as an investment those routes and vessels which are actually of questionable value rather than to continue the present method of Government ownership and semi-Government operation, especially when instances are known where ten ships have been turned over to agents to make possible the continuous operation of five!

The formula that seems to us the solution of the whole problem was given in the editorial "Why Government Ownership?" published on page 387 of our July issue. This reads as follows: "First scrap all ships that cannot possibly be sold because unfit for profitable operation; they are in any event as much of a menace to the progress of the American merchant marine as are derelicts to navigation. Then sell all of the others to private owners either after first installing Diesel engines and in other ways refitting for competitive business such of the vessels as would be amenable to that treatment, or else authorizing the purchaser to do so, the job to be financed by the Government."

To those corporations of American citizens which indicate that they are willing to purchase such vessels or routes, terms of payment that they can meet should be granted. Moreover, the prices charged for the vessels, as well as for the routes, should be in proportion to their respective capital values and their possible earning power. In the event that these values are not known or cannot be determined with any reasonable degree of certainty in advance, an upset minimum based on the worth of the ships alone could be filed, the question of possible additional compensation to be determined after a given period of actual operation on stipulated routes under private ownership.

If this plan were put into effect, the result would be the elimination of a Government expense of at least $50,000,000 a year and the return to the Treasury of some part of the cost of the ships. At the same time, a new lease of life would be given to the American merchant marine as a whole and a new hope to that great industry which has to do with the building, repairing and equipping of ships.

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Revision of Our Maritime Laws Should Be Speeded Up

ONE thorn in the side of the American merchant marine should be speedily removed, and that is the antiquated rules and regulations under which Federal inspection of vessels is conducted. Not only are the present rules and regulations antiquated, but often they are confusing and difficult of uniform and fixed interpretation. Moreover they frequently overlap the rules of the ship classification societies and are at variance with good practice. For some time past a committee acting under Congressional authority and with the co-operation of the Bureau of Navigation and Steamboat Inspection Service of the Department of Commerce has been working on a revision of the maritime laws. Considerable progress has been made and it is believed that the result will correct most if not all of the existing evils. But the matter should not be permitted to lag. American shipowners face too many obstacles to be handicapped at the start by antiquated Government laws and regulations. That the need for prompt action in this matter is acutely felt is shown by the fact that the National Merchant Marine Association has only recently adopted resolutions urging that the recommendations for the revision of the maritime laws be presented to the Congress without delay.

Shipbuilding Prospects

IN spite of the continued depression in the world's shipping there are pending in American shipyards orders for at least thirty-seven new vessels as well as a considerable volume of repair and reconditioning work. While this does not in any way indicate the approach of another shipbuilding boom, it does at least promise some relief for the shipbuilders. Most of the vessels for which bids have been asked are for coastwise or inland waterway service. They include combined passenger and cargo steamships for the Clyde, Southern Pacific, Old Dominion, Oceanic and New York and Porto Rico Lines, a fleet of twenty Diesel electric motorships for lake, canal and coastwise service, cargo ships for special interests and a number of special types of vessels for the inland waterways, including eight ferryboats for the city of New York.

Many of these contracts would probably have been placed weeks ago, if prices had not shown a tendency to stiffen. After a prolonged slack period, however, shipbuilders cannot be expected to take work at ruinous figures and there seems to be no indication of any marked reduction in the cost of shipbuilding materials. As a matter of fact, those who months ago put off the placing of orders for new tonnage in the expectation of securing more favorable prices later on missed a golden opportunity for the day of rock bottom prices seems to have passed and the price of steel apparently is destined to remain far above its level of eighteen months ago.

Meanwhile, certain of the steamship companies need new vessels and it is a question whether any possible saving in initial cost which might be made by waiting for more favorable prices would begin to compensate for the loss of business which might be gained by immediately adding new tonnage to their fleets. On the other hand, the shipyards are badly in need of new contracts to maintain their skilled forces and it will not be long, if orders are further delayed, before the yards will be far less capable of turning out the work as efficiently and economically as they are today.

Shipyards Committee Appointed

ONE factor which may have a decided influence on the future of American shipbuilding is the work of the shipyards committee recently appointed for the investigation of general conditions affecting shipyards and ship repair plants throughout the country with a view to formulating recommendations for presentation at the forthcoming American Marine Congress in New York city, November 5 to 10. This committee, headed by J. Harry Mull, president of the William Cramp and Sons Ship and Engine Building Company, and including J. G. Pew, president of the Sun Shipbuilding and Dry Dock Company; H. G. Smith, vice-president of the Bethlehem Shipbuilding Corporation; E. P. Morse, president of the Morse Dry Dock and Repair Company, and J. J. Tynan, general manager of the Union Plant of the Bethlehem Shipbuilding Corporation, has already established headquarters in the office of the Atlantic Coast Shipbuilders' Association in Philadelphia and is seeking the co-operation of over two hundred establishments engaged in all branches of shipbuilding and marine repair work. This will give the shipbuilders a chance for co-ordinated action which is bound to reflect favorably on the future welfare of the industry.

Diesel Engines at the Marine Show

THE number of manufacturers and licensees of Diesel engines that are exhibiting at the forthcoming Marine Exposition at the Grand Central Palace, New York, during the week of November 5 to 10 is a significant indication of the belief of a great many shipping experts that this form of propulsion is bound to be the next important development in the establishment of our merchant marine upon an economic basis.

As stated by Professor Chapman in his comparison of steamships and motorships which appeared in the January, 1923, issue of this magazine, if capital is to be interested in shipping ventures it must be shown where it can make a reasonable profit on its investment. Professor Chapman gives this profit at 10 percent which, with the fixed charges of 15 percent for interest, insurance and depreciation, makes a total of 25 percent for the capital charge. Now with the Shipping Board apparently willing to practically give away good vessels providing they are converted to motorships, and with the total estimated cost of these converted vessels at $50 or less per deadweight ton or about $20 per ton less than they can be produced in England, it is evident that 25 percent on the difference in capital required to secure a good motorship here as compared with abroad is quite a subsidy in itself.

One thing is certain, and that is that those who have Diesels to sell believe in their future as the space devoted to the internal combustion engine at the Marine Exposition will exceed that given to all other forms of propulsion combined.

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What Is the Remedy for the Shipping Situation?

By "Old Scotch"

We are rapidly approaching a showdown in shipping matters in this country. For the past two or three years, since the collapse of the great shipbuilding and shipping boom we have drifted along without a definite policy and without clear-cut leadership. The world trade has declined and freight rates have reached such a low level that the ships now conducting the ocean trade of the world seem only to vie with one another for bare existence without thought of profits to those who have their capital invested in them. We all know that the rehabilitation of normal conditions on the seas is a long time off, and depends upon the stabilization of the former European combatants in the Great War. Our own United States is the only one of the great nations of the earth which has even a semblance of prosperity. While we naturally are deeply interested in all that pertains to general world prosperity, we must consider our own interests of paramount importance; to retain these present fair conditions and to improve them where possible must necessarily receive our first attention.

IT has been conclusively demonstrated to the minds of all thinking Americans that much of the credit for our present comparatively better conditions is due to the fact that we have had sufficient American vessels to regulate freight rates on our exports and to establish and extend our foreign business in new territories. This has, to date, been accomplished principally by the medium of the Government-owned ships in foreign trade, operated by the Shipping Board through the existing system. This system has, owing to the general depression, been operated at a considerable direct loss, chargeable to operation alone. But in the broad view, this extension of the nation's business has resulted in a decided gain to our industries taken as a whole.

The Government Must Help

Two outstanding conclusions may be deduced from our present shipping activities in foreign trade.

1. It is clearly proven from our experience with the operation of Government tonnage that we must have our own ships to conduct at least half of our own foreign trade.

2. To keep sufficient American ships in the foreign trade, to maintain even our present business conditions, and to better them when world trade improves, as they must at some time, the United States Government itself must help either directly or indirectly and perhaps both.

Regardless of the controversy between the Shipping Board and the steamship owners, which is now bringing the subject of Government ownership and operation or private ownership and operation to a crisis, the great object to be obtained is the guarantee to our farmers and merchants that a sufficient amount of American tonnage will be maintained.

Losses to Be Reduced

Whatever may be the outcome of the dispute between the Shipping Board and the shipowners, it seems to be a settled fact that the present system of operation of Government tonnage is to be replaced by some other method in order to reduce, if possible, the direct financial loss to the National Treasury. This undoubtedly can be accomplished, but just how is the all-absorbing question of the hour.

Direct subsidy in the manner prescribed by the bill which failed of action in the last Congress would undoubtedly have solved the problem, but that now seems to be out of the question for reasons which need not here be discussed.

While it is true that our foreign trade, that is such portion as is being carried under the American flag, is borne in ships directed by the Shipping Board, the future of the American merchant marine in foreign trade is much broader than the mere question of Government or private ownership. The Shipping Board and the Shipowners' Association, while parties most interested in the present situation, are not alone sufficient to decide on the great shipping question now before the country. The farmers, manufacturers and merchants have the greatest interest in the subject, as the correct solution will largely enter into the question of their success in the future.

Marine Congress to Point the Way

Fortunately for all concerned is the fact that the all-American Marine Congress has been called, to meet in New York the first week in November (5th to 10th, inclusive). There will assemble representatives from all branches of industry, directly or indirectly interested in shipping. The proposal for this Congress has been seized upon with the greatest enthusiasm, and representative men will be present from all sections of the country. The farmers will be represented by delegates from the American Farm Bureau, the manufacturers by a number of prominent organizations including the American Manufacturers' Export Association and the United States Chamber of Commerce. All shipbuilding and shipping organizations have appointed delegates, as have various labor associations. Numerous transportation companies, whose interests are closely allied with foreign shipping will through able representatives take part in the discussions. Municipal authorities interested in commerce will be represented to discuss port facilities. The American Legion, the greatest of all our patriotic societies, will have delegates and members present. The marine branches of the Federal Government will each have a representative present to join in the work of the Congress.

With such a galaxy of talent present and sincerely interested in the subject, it is plain to be seen that all phases of the shipping problem can be intelligently discussed by men who can speak.

Enforcement of Existing Legislation May Be Urged

It is difficult even to predict what the recommendations of this gathering will be, but it is safe to assume that intensive consideration will be given to the legislation already on the statute books, which if enforced or invoked will be of great assistance to the maintenance of American ships in the foreign trade. Although former Presidents Wilson and Harding, for reasons which they deemed sufficient, failed to put the policy of discriminating duties in force, it may yet be possible, by certain modifications which may be recommended by the Congress, to convince President Coolidge of the desirability of resorting to that method of encouraging our shipping. Some experts claim that the principle of discriminating trade can be applied advantageously in the indirect trade, such as the Central and South American routes,

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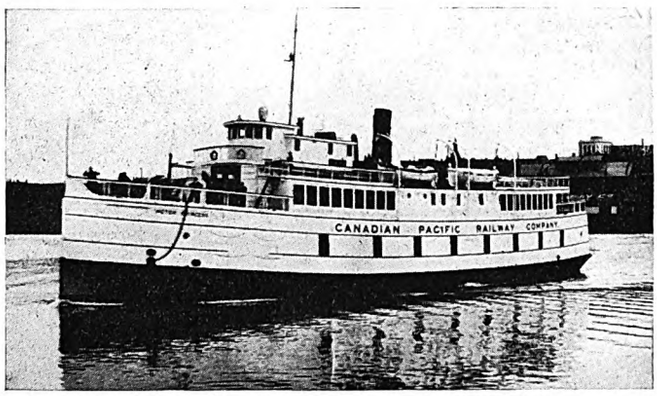
without resorting to the abrogation of existing treaties with the great shipowning nations.

The sections of the Jones Act providing for preferential railroad rates on goods carried in American bottoms have not yet been enforced, and give promise of considerable help if properly worked out and applied.

Extension of Coastwise Laws to the Philippines

The inevitable enforcement of the provision relating to placing the Philippines under the coastwise law will be a great boon to American shipping. There now seems but little reason why President Coolidge should delay in making that portion of the Jones Act operative. A good strong resolution from the Marine Congress might have a very beneficial effect towards accomplishing that much desired action.

The increase in freight rates feared by our Philippine brethren (the fear largely inculcated by our shipping rivals in Europe) has been proved to be largely a bugaboo, by comparison with existing freight rates between New York and San Francisco, a distance about the same as from the latter port to Manila. It is estimated that there are 1,272,780 tons of shipping engaged in the Philippine trade. The United States would undoubtedly secure three-fourths of this



Automobile Ferryboat Motor Princess Built for Canadian Pacific Railway

trade for our own ships, if the coastwise laws are made applicable, as now authorized by law.

As before stated, the Government must help to retain the American flag in foreign trade, and the Marine Congress will inevitably devote much of its time to discussing and recommending ways by which this Governmental help can be efficiently applied without too much drain on the Treasury.

Utilization of Naval Forces on Merchant Vessels

It has been suggested that the wage differential, now the most serious handicap on American ships in world wide competition, may be overcome by utilizing enlisted men from the authorized personnel of the Navy on ships engaged in the foreign trade. Despite the opinion of strictly militarists, it is very apparent that the impoverished nations of the world will not be able to engage in any great conflicts on the sea for some years yet to come. While we all believe in preparedness, there is no particular use in over preparedness, and we must use good sane judgment in appraising conditions which can arise. The utilization of naval forces on merchant vessels would in no way detract from their readiness to meet any emergencies which might arise, and at the same time they may be extremely useful in helping to solve our merchant marine problem.

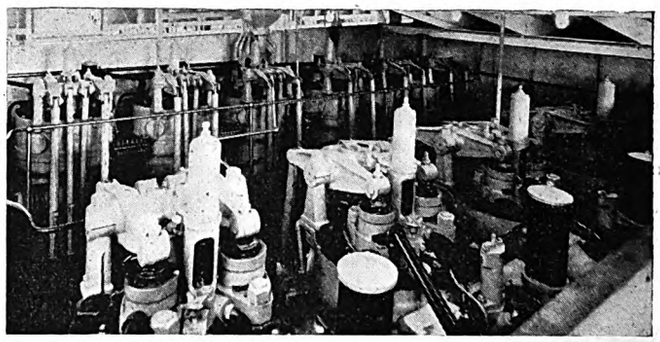
These and other phases of the problem will most likely receive attention at the forthcoming marine gathering, and it is but fair to presume that the recommendations made will be based on the good sound judgment of all interested parties.

Shipping Board Should Postpone Action

In view of the near approach of this all-American Marine Congress, of the great diversity of the interests represented, and of the intelligent discussion which will ensue, does it not appear that it would be fitting for the Shipping Board to postpone any definite policy regarding the method of using its ships, until they can have the benefit of the recommendations made by this nation-wide council?

New Motor Ferryboat Has Capacity for Fifty Cars

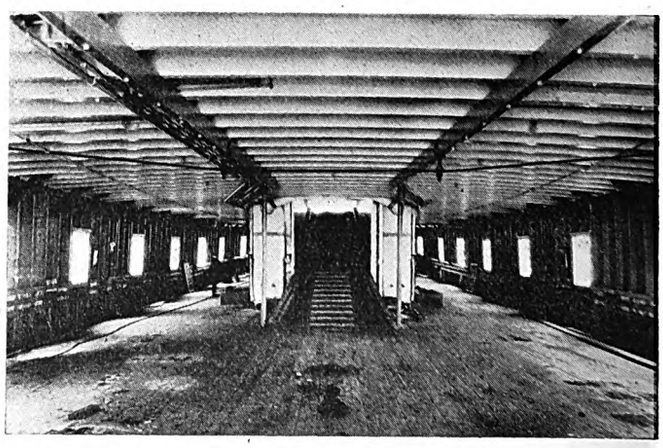
THE new *Motor Princess,* built by the Canadian Pacific Railway, is said to be the first specially built automobile ferryboat in the world, and a new floating link in the chain of friendship binding the United States and Canada together. Motorists board her, 250 strong and 50



600 Horsepower McIntosh & Seymour Diesel Engines of the Motor Princess

cars at a time, at Bellingham, Wash., cross the Gulf of Georgia to Sidney, Vancouver Island, run their cars off the boat and tour over automobile roads to Victoria and Nanaimo, or farther north.

The *Motor Princess* is a staunch craft 170 feet long and 42 feet wide, with decks 11 feet high. She is driven at a speed of 14 knots by two 600 horsepower McIntosh & Sey-



Main Parking Deck Looking Forward to Ramp Leading to Upper Parking Deck

mour Diesel engines, and there are ample observation and smoking rooms, as well as a ball room and tea room, for the comfort of passengers during the three hours' trip between the States and Canada. Last year 18,000 automobiles were carried on the *Princess* steamers from Seattle to Victoria and Vancouver, and now that the *Motor Princess* is at their service it is expected that even more will visit Vancouver Island and the British Columbia mainland.

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Shipping Board Plan Held Illegal

Attorney General Advises President Shipping Board Lacks Authority to Carry Out Proposed Plan

By Harold F. Lane

WASHINGTON, D. C.

ATTORNEY General Daugherty on September 19 threw a large monkey-wrench into the plans of the Shipping Board for operation of the Government fleet through 12 to 18 subsidiary corporations of the Emergency Fleet Corporation, whose stock was to be owned by the Shipping Board, by giving President Coolidge an opinion, at his request, that the so-called Farley-Lasker plan, suggested by the policy committee of the board as a substitute for the present plan of operating through managing agents, is illegal. The result is expected to be that the whole question of Shipping Board policy will again be thrown before Congress at the coming session.

Result Not Unexpected

Such an opinion from the attorney general was not exactly unexpected, as it is in line with the opinions of three of the seven members of the Shipping Board who had voted against the adoption of the subsidiary plan, as well as of many others outside the board, although counsel for the board had declared the plan legal, and President Coolidge had previously let it be known that, even if the plan were held legal, he proposed to have a further study made of the advisability and wisdom of the policy, by the special committee which he had suggested.

The President regards it as fundamental, it was said at the White House, that any plan of operation must be such as will assure adequate shipping facilities for the commerce of the country and at the same time provide a merchant marine auxiliary to the Navy for the national defense.

It was also stated officially after the President had received the opinion of the attorney general that he had no new policy to suggest and that it is not the business of the President under the law to try to formulate policies for the Shipping Board, although he would be glad to and expected to confer shortly with the members of the board as to some plan for trying to get the ships into private hands as soon as possible. It was added that the plan had appealed to him as probably the best step toward liquidation and private operation that could be taken at this time but that since it has been decided impossible to make it effective under the present statute he did not know what would be done or whether the board would desire legislation.

Alternatives Available

The alternatives left to the board now apparently are to try to work out further economies under the present plan; to adopt for the entire fleet a plan similar to that under which the United States Lines operate, with a salaried manager employed directly by the Government, or to ask for some modification of the law.

Attorney General Daugherty advised the President that the Government does not possess the power under the Merchant Marine Act to carry out the proposed plan of the Shipping Board to dispose of Government-owned ships through the incorporation under state laws of corporations authorized to own and operate such craft. He was of the opinion, he added, that the statute authorizes a sale of the ships and not an exchange of title thereto in consideration of stock in a corporation, which the proposed plan of the Shipping Board contemplated when the matter was placed before President Coolidge for consideration.

It evidently was the intention of Congress, Mr. Daugherty said in his opinion, to authorize a sale for cash or on credits not to exceed 15 years from the making of the contract of sale, and that an exchange whereby the Government receives shares of stock in return for its ships is not a sale within the provision of the act and does not meet the condition limiting deferred payment. Moreover, if the transfer of vessels to state corporations in return for the issuance of capital stock is to be regarded as a passing of title authorized by the sale provisions of the act, the attorney general added, "it is obvious that Section 14 of the act must be ignored, for its provisions, as we have seen, contemplate the payment of money and not shares of stock into the Treasury of the United States as miscellaneous receipts."

If any weight is to be given to the long settled legal principle that a corporation is a distinct juristic person, holding its property and exercising its corporate function through the appointed agents, Mr. Daugherty said, "it must be admitted that under the present proposal the Government will in a real and substantial sense part with title to its vessels."

Government Not Authorized to Transfer Ships

Serious questions likely would arise as a consequence of the assumption by the Government of the ownership of stock in a private corporation controlled by state law, the attorney general pointed out, as it possibly would be contended that under statutes imposing assessments to meet the debts of the corporation the Government would be liable as any other stockholder. The vessels transferred to the corporation, he added, might even become legally subject to state taxation, and such immunity from suit as the Government now enjoys with respect to the operation of its fleet would very likely disappear. Undoubtedly, also, the attorney general further explained, the directors and officials of the proposed corporations would not be officers of the United States, and thus the United States in the administration and operation of its shipping industry would lose (except under statutes like that under consideration in United States vs. Bowman, 206 U. S. 94) the benefits of the sanctions provided by law to secure the good conduct and public accountability of its agents.

These considerations, Mr. Daugherty said, impelled him to the opinion that it was not the intention of Congress to authorize the executive branch of the Government to organize corporations to take title to the Government's ships, and in the place of responsible Government control by the Shipping Board substitute a management by directors of private corporations amenable alone to the laws of another sovereignty. There have been instances of the formation of corporations to aid in the discharge of administrative function the attorney general explained, adding that, however, in each case, so far as he was aware, there had been unmistakable legislative authority. There is no language of like import in the statute now under consideration, Mr. Daugherty declared, and he concluded that, "the authority to transfer the ships to private corporations can not fairly be rested on the provisions in the act *relating to sales.*"

Is it possible to construe the provisions *relating to the maintenance and operation* of the fleet as permitting, as a method of operation, the proposed transfer? Mr. Daugherty asks, and proceeds to answer the question by quoting sections

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7 and 12, of the act, which relate to the establishment and operation of steamship lines, reconditioning, etc., asserting that there is no further provision, than is found in the two sections quoted, for the delegation of the authority confided by the statute in the officials of the Shipping Board.

"It is a well settled rule," Mr. Daugherty said, "that a public officer or public body can not delegate powers which require the exercise of judgment or discretion. . . . The operation and maintenance of the fleet until sold was entrusted by Congress to public officials who are at all times subject to congressional control. It cannot be admitted that this important trust can be put in the hands of the directors of a private corporation who bear no official relation to the Government; who are merely the trustees of the corporation and removable as such only through the processes of corporate management prescribed by the various and varying systems of state law.

"Moreover," continued Mr. Daugherty, "if the proposed plan is to be regarded not as a sale, but merely as a method of operation, it does not conform to the program set forth in section 12 (of the act). This section contemplates that operation shall continue only until the vessels are sold. *And yet under the plan it is made impossible to sell the ships hereafter for the reason that the Government will have placed the legal title to them in the proposed corporation and will have nothing to sell except the stock which it has received in exchange.*"

Mr. Daugherty called attention to the fact that when the bill for a merchant marine act was introduced in the House it contained a provision which stated that the power and authority vested in the board might be exercised directly by the Shipping Board, or by it through the United States Emergency Fleet Corporation *or other agencies created pursuant to authority of law.* The underscored words were stricken out in the Senate, and the House agreed to the amendment. This circumstance, Mr. Daugherty said, was significant, and it "negatives the idea that Congress intended that the power and authority vested in the board should be exercised by any one outside the board itself or the Emergency Fleet Corporation."

Board Cannot Make Rules to Cover Plan

In connection with the suggestion that the power of the Shipping Board under the law to make rules and regulations might be broad enough to authorize the board to put into execution the plan proposed, Mr. Daugherty states that Section 19 of the act directs the board to aid in the accomplishment of the purposes of the act to make all necessary rules and regulations to carry out its provisions . . . "rules and regulations which are not inconsistent with the act or which are not unreasonable or inappropriate."

But rules and regulations not authorized by the statute, the attorney general held, would be invalid, and the authority to promulgate rules and regulations "can, therefore, add nothing substantial to the powers conferred."

Finally, Mr. Daugherty says, the question is presented whether the language of section 1 confers the power proposed to be exercised.

"That section, as we have seen," the attorney general advises, "announces a national policy. After declaring that for the national defense and for the growth of commerce it is necessary that the United States should have a merchant marine ultimately to be owned and operated privately by its citizens, the section provides . . . 'it is hereby declared to be the policy of the United States to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine, and, in so far as may not be inconsistent with the express provisions of this act, the United States Shipping Board shall, in the disposition of vessels and shipping property as hereinafter provided, in the making of rules and regulations, and in the administration of the shipping laws keep always in view this purpose and object as the primary end to be attained.'

"But this adds nothing to the power conferred. The language is that in the disposition of the vessels and shipping property 'as hereinafter provided' this end shall always be kept in view. The authority to sell and until sold to operate the Government vessels was conferred in subsequent sections; and, within the scope of the powers given, the board is directed to keep in view the policy and purpose thus announced. Although the title or preamble of an act may be referred to when ascertaining the meaning of a statute which is susceptible of different constructions, they cannot control or restrain express provisions. . . . Nor can they enlarge or confer powers. . . . I accordingly have the honor to advise you that in my opinion the power to carry out the proposed plan does not exist."

President Coolidge has devoted very close study during recent weeks to the situation of the Shipping Board and its proposed plan and several times had called upon the board for further details and estimates as to how much it would cost and what savings could be effected as compared with the present plan. He had also called the entire membership of the board into conference with him at the White House on the evening of August 30, at which he is said to have been a "good listener." It was after this conference that the attorney general was asked for a formal opinion, although it is understood that the board had previously received informal assurances that its plan would not be in violation of the existing law.

Conference with Ship Owners and Operators

There was practically nothing in the way of definite results from the all-day conference held between the board and committees representing the steamship operators and owners at Washington on August 28, at which the latter were given an opportunity to submit alternative plans. A new plan as a substitute for the present managing operator contract was proposed by C. H. Potter on behalf of the United States Ship Operators' Association, the purpose of which was to put on the operator or agent a greater measure of responsibility than at present, so that, if the present losses increase, the agent would bear a substantial share of such increase, whereas, if they diminish, he would receive some of the resulting benefit. It was proposed to set up an agreed standard figure for each trade route to represent the net result per voyage and that, if the agent should do no better than this standard, he would receive no compensation for operation but only a husbanding fee. If his operation should show a surplus above the standard figure, it would be divided on an agreed percentage basis between the board and the operator and a certain percentage of the amount received by the board was to go into a purchase and building fund which might be applied on the purchase of ships by the operator.

Gale H. Carter, vice-president of the American Steamship Operators' Association, also presented a statement of arguments against any plan of Government operation with a suggestion that the board and the shipping men endeavor by co-operation to work out a "plan by which the Government ships can be most efficiently and economically operated by private parties and ultimately transferred to private ownership," and "the board gradually retired from the shipping business."

Chairman Farley, however, gave no indications of having been at all impressed with the alternative suggestions presented by the shipping men and said that, if anything were to be accomplished, the board must have more concrete and specific proposals and without delay. The conference was adjourned with the idea that the shipping men might get together and formulate a more definite plan for the consideration of the board later, if they could do so within a very short time.

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Secretary Hoover to Preside as Chairman of the Marine Congress During American Marine Week

Greatest Convention Ever Held of Commercial, Manufacturing, Farming and Maritime Associations to Discuss Merchant Marine Problems During Week of November 5 to 10

THE eyes of the nation will be focussed on New York during the week of November 5 to 10, for in the space of six short days technical and practical shipping questions and the exhibits at the great annual Marine Exposition will be given the widest publicity. The fact that organizations in such cities as Omaha, Duluth, Cincinnati and many other interior points are going to the expense of sending delegates to this Congress shows that the country at last has awakened to the necessity of an American merchant marine.

The writer attended a farmers' conference in Cincinnati on the merchant marine in June and he was greatly surprised and pleased to see the enthusiam displayed by the delegates on shipping matters. They have come to realize that their prosperity depends on economical and efficient transportation of their products and with that realization has come the determination to find a solution that will induce private capital to invest in shipping.

There are four major groups of our industries, namely: Agriculture, mining, manufacturing and transportation. The first three have been developed far beyond the actual needs of the country and now agriculture in particular is severely suffering because we have, in our laws and our regulations, handicapped our transportation facilities. In fact, our merchant marine is now threatened with the evil of direct Government operation which the former chairman of the Shipping Board, Albert D. Lasker, once characterized as "poison ivy in the garden of industry."

It is useless to harp on what might have been done if the subsidy bill had been passed. We are faced with the problem of making a new start but with the facts and findings arrived at by a non-partisan body—and our merchant marine question is just as non-partisan as our army or navy—representing all sections of the country, we will have something to build on that Congress will not dare to ignore.

This Congress, as we have said in our title, will be presided over by Secretary Hoover whose reputation for efficiency in organization and for getting results is international.

Announcement of the personnel of the Great Lakes District Committee; a special technical committee to represent the shipowners of the Great Lakes; a committee representing the agricultural interests of the Mid-West, and the Marine Insurance and Classification Committee, in connection with the Congress is the latest word from the headquarters of the American Marine Association, at whose invitation the Congress will be held. Inasmuch as the chief executives of four cities are listed as members of the Great Lakes Committee, much is expected of the group whose personnel is the more interesting when it is remembered that the mayors of six cities have already consented to serve on the Delaware District Committee.

The make-up of the Great Lakes District Committee, which will represent the regional interests of all of the Great Lakes States and which is now complete, is as follows:

Chairman, F. C. Bradbury, manager of the Marine Department of the Crane Company, Chicago, Ill.
Honorary Chairman, Hon. William E. Dever, Mayor of Chicago, Ill.
Hon. George E. Leach, Mayor of Minneapolis, Minn.
Hon. Fred Kohler, Mayor of Cleveland, Ohio.
Hon. Judge B. F. Brough, Mayor of Toledo, Ohio.
William M. Pattison, president, The W. M. Pattison Supply Company, Cleveland, Ohio.
R. E. Sawhill, editor, *Marine Review*, Cleveland, Ohio.
Harold Emmons, president, Detroit Board of Commerce, Detroit, Mich.
C. E. Boyd, assistant secretary, Detroit Board of Commerce, Detroit, Mich.
A. A. Schantz, president, Detroit & Cleveland Navigation Company, Detroit, Mich.
W. W. Nichols, vice president, Society of Industrial Engineers, Detroit, Mich.
Robert June, Diamond Power Specialty Company, Detroit, Mich.
A. M. Creed, Creed & Company, Detroit, Mich.
John Cowell, president, Board of Trade, Toledo, Ohio.
P. R. Merk, Board of Trade, Duluth, Minn.
Walter J. Fitzgerald, Lake Transportation & General Insurance, Milwaukee, Wis.
Harwood Frost, Terminal Engineer, Chicago, Ill.
F. E. Heath, Association of Commerce, Grand Rapids, Mich.

A special Technical Committee, which will represent the Great Lakes Ship Owners, is making rapid strides in the formulation of a policy which is expected to tie together the shipping men of the Great Lakes and the shipping men of the coast. This committee is as follows:

Chairman A. A. Schantz, president, Detroit & Cleveland Navigation Company, Detroit, Mich.
C. F. Bielman, secretary and general manager, White Star Lines.
Oliver S. Dustin, vice president, Ashley & Dustin.
P. G. Findlay, traffic manager, Dodge Bros. Auto Company.
Henry T. Ewald, president, Ewald Advertising Agency.

A powerful group under the leadership of George A. Carey, secretary of the Omaha Chamber of Commerce, will represent the agricultural interests of the Mid-West and is in itself a notable committee. It is made up as follows:

Chairman, George M. Carey, secretary of the Omaha Chamber of Commerce.
Carl H. Gray, president, Union Pacific Railroad, Omaha, Neb.
Henry W. Meile, vice president, Merchants National Bank of Omaha, Nebr.
H. D. Lute, secretary of Nebraska Farmers Bureau Association, Lincoln, Nebr.
Joseph F. Leopold, general secretary, Iowa State Chamber of Commerce, Des Moines, Iowa.
James F. Coupe, assistant secretary, Iowa Farm Bureau Association, Des Moines, Iowa.
Harry L. Keefe, president, Nebraska Farm Bureau Association, Walthill, Nebr.

Additional committee personnel is announced with the naming of the Marine Insurance and Classification Committee, which is made up as follows:

Chairman, S. D. McComb, manager, Marine Office of America, New York City.
Captain C. A. McAllister, vice president of the American Bureau of Shipping, New York.
Charles D. Mather, Philadelphia.
Frank Gair Macomber, Boston, Mass.
James A. Mathews, San Francisco, Cal.

The latest word received on committee-chairmanship acceptances is that R. S. MacElwee, commissioner of the Port of Charleston, S. C., has agreed to serve as head of the Southern States District Committee.

With regard to the Marine Show, the list of exhibitors is growing steadily, one of the latest additions being the port of Charleston, S. C.

The following is a list of exhibitors who have already

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reserved space for the 1923 exposition, together with their booth numbers:

	Booth No.
Ajax Rope Company, Inc., 149 Broadway, New York.	44
Akimoff Propeller Company, Harrison Building, Philadelphia, Pa.	67–B
American Car & Foundry Company, 165 Broadway, New York	85 (part)
American Krupp System Diesel Engine Company, 165 Broadway, New York	80
American Society of Marine Designers, 29 West 39th Street, New York	294 and 295
American Steel Foundries, Chicago, Ill.	52
Asbestolith Manufacturing Company, 1 Madison avenue, New York	97
Ashton Valve Company, 161-179 First Street, Cambridge 41, Boston, Mass.	(part of) 18 and 19
Babcock & Wilcox Company, 85 Liberty Street, New York	76–77
Beaver Tile, Inc., 442 West 42nd Street, New York	11
Bethlehem Shipbuilding Corporation, Ltd., Bethlehem, Pa.	68
Briggs Engineering Works, 227 24th Street, Brooklyn, N. Y.	104
Brown Instrument Company, 50 Church Street, New York	65–B
Burmeister & Wain, Ltd., 27 Whitehall Street, New York	86
The Coen Company, 50 Church Street, New York	79
Wm. Cramp & Sons Ship & Engine Bldg. Company, Philadelphia, Pa.	70–71
Crane Company, 836 South Michigan Avenue, Chicago, Ill.	66
Crane Packing Company, 59 Park Place, New York	227
Diamond Power Specialty Corporation, Detroit, Mich.	74
O. M. Edwards Company, Inc., Syracuse, N. Y.	15
Electric Storage Battery Company, 26 West Broadway, New York	31
Electro Sun Company, Inc., 161 Washington Street, New York	253
L. W. Ferdinand Company, 152 Kneeland Street, Boston, Mass.	228
Fire Detecting Wire Corporation, 2 West 45th Street, New York	335–336
Foster Marine Boiler Corporation, 111 Broadway, New York	101
General Carbonic Company, 542 Fifth Avenue, New York	49
General Electric Company, Schenectady, N. Y.	3–4–5–6
B. F. Goodrich Rubber Company, Akron, O.	84 (half)
Griscom-Russell Company, 90 West Street, New York.	60
Hill Rotors, Inc., 42 Broadway, New York	252
Hooven-Owens-Rentschler Company, Hamilton, Ohio.	17
Journal of Commerce and Commercial Bulletin, 32 Broadway, New York	50
Walter Kidde & Company, 140 Cedar Street, New York	49
Knudsen Motor Corporation, 30 Church Street, New York	81
London Steam Turbine Company, 149 Broadway, New York	29
Lunkenheimer Company, Cincinnati, O.	95
McIntosh & Seymour Corporation, Auburn, N. Y.	59
Mack Engineering & Supply Company, Inc., 136 Liberty Street, New York	348
Marine Decking & Supply Company, 116 North Delaware Avenue, Philadelphia, Pa.	110
Marine Engineering and Shipping Age, 30 Church Street, New York	94–106
The Marine News, 26 Water Street, New York	83
The Marine Review, Cleveland, O.	30
Morse Dry Dock & Repair Company, foot 56th Street, Brooklyn, N. Y.	72
National Malleable Castings Company, Cleveland, O.	57
National Meter Company, 229 Broadway, New York.	14
Natural Carbonic Gas Company, Newark, N. J.	267
Newport News Shipbuilding & Dry Dock Company, Newport News, Va.	32
Northern Fire Apparatus Company, Minneapolis, Minn.	54
Pantasote Company, 11 Broadway, New York	28
Peabody Engineering Corporation, 110 East 42nd Street, New York	13
Pneumercator Company, 40 Flatbush Avenue, Brooklyn, N. Y.	36
Port of Charleston, Charleston, S. C.	255
Power Specialty Company, 11 Broadway, New York	101
Radio Corporation of America, New York	48
The Roto Company, Hartford, Conn.	266
Row & Davis Engineers, Inc., 90 West Street, New York	63
R. S. V. Valve Corporation, New York	51
Rubber-All-Products Company, 821 Broadway, New York	69
Scovill Manufacturing Company, Waterbury, Conn.	58
Shipley Construction and Supply Company, 42nd Street and 2nd Avenue, Brooklyn, N. Y.	33
Sperry Gyroscope Company, Manhattan Bridge Plaza, Brooklyn, N. Y.	20–21–22–23
The Sterling-Cooper Corporation, 220 West 42nd Street, New York	67–A
B. F. Sturtevant Company, Hyde Park, Boston, Mass.	107
Submarine Signal Company, Boston 9, Mass.	256
Sun Shipbuilding Company, Chester, Pa.	78
The Superheater Company, 17 East 42nd Street, New York	73
The Texas Company, 17 Battery Place, New York.	35
W. & J. Tiebout Company, 118 Chambers Street, New York	27
P. S. Thorsen & Company, Inc., 82 Coffee Street, Brooklyn, N. Y.	98
Valentine & Company, 456 Fourth Avenue, New York.	43
Westinghouse Electric & Manufacturing Company, 165 Broadway, New York	82–83
C. H. Wheeler Manufacturing Company, Lehigh and Sedgley Avenues, Philadelphia, Pa.	7
Worthington Pump & Machinery Corporation, 115 Broadway, New York	96

Naval Architects and Marine Engineers to Hold Annual Meeting in New York on November 8 and 9

THE thirty-first general meeting of The Society of Naval Architects and Marine Engineers will be held in the Engineering Societies Building, 29 West 39th Street, New York City, Thursday and Friday, November 8 and 9. Professional sessions will begin at 10 A. M. each day.

The following papers will be read and discussed at the professional sessions:

THURSDAY, NOVEMBER 8

"Additional Notes on American Shipyard Apprenticeships, Evening Schools and Scholarships." By Charles F. Bailey, member of council.

"Comments on Aviation, Naval and Commercial." By Captain Emory S. Land, CC. U. S. N., member.

"Some Factors Affecting the Economy of Operation of the Lake Freighters." By Professor Anders Linblad, member.

"Wetted Surface." By Henry H. Schulze, member.

"Propeller Design Based Upon Model Propeller Experiments." By Rear Admiral David W. Taylor, CC. U. S. N., (Retired), honorary vice-president.

FRIDAY, NOVEMBER 9

"The Probable Effect Upon Ports of the Probable Growth of Ships." By Commander John H. Walsh, CC. U. S. N., (Retired), member.

"The Economics of Trans-Atlantic Liners of Various Lengths." By Carl E. Peterson, member.

"The Manufacture of Heavy Steel Castings for Ships with Special Reference to Stern Frames, Rudders, Shaft Brackets and Stems." By Hugo P. Frear, member of council.

"Fuel Conservation and Engineering Performance Standards by Shipping Board Vessels." By Joseph E. Sheedy, member.

"Some Considerations on the Conversion of Steamships to Motorships." By Robert Haig, member of council.

The annual banquet will be held in the Grand Ball Room of the Waldorf-Astoria Hotel, New York City, on Friday evening, November 9, at 7:30 P. M. Immediately preceding the banquet there will be a reception beginning at 7:00 P. M.

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What Shall Be Done with the Ex-German Transatlantic Passenger Liners Agamemnon and Mount Vernon?

Conversion to 18-Knot Oil Burners Would Cost Only $3,000,000 Each and Would Provide Excellent Running Mates of the George Washington for Next Year's Passenger Business

[Contributed]

THE twin screw steamships *Agamemnon* and *Mount Vernon,* formerly known as the *Kaiser Wilhelm II* and *Kronprinzessin Cecilie* respectively, were prior to the war familiar to the transatlantic traveling public as the crack ships of the North German Lloyd Line. Both are now lying in idleness, one at Boston, Mass., and the other at Brooklyn, N. Y., and because of the vicissitudes of the United States Shipping Board and Emergency Fleet Corporation are apparently destined to remain in idleness. It is apropos to present a brief review of the histories of these vessels leading up to the events which now find them, splendid as well as profitable in their day of passenger service, inactive rather than as a valuable part of the United States Lines' fleet.

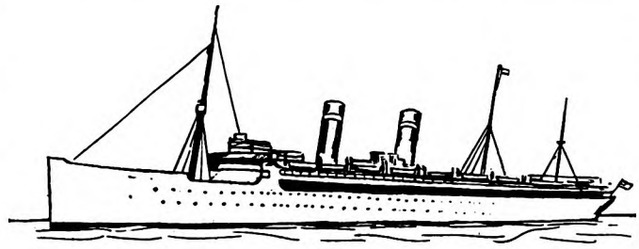

Fig. 1.—Sketch Showing How the Agamemnon and Mount Vernon Would Look if Converted to 18-Knot Oil Burners

The *Agamemnon* was built by the Vulcan Works, Stettin, Germany, in 1902, and was first placed in service in the early part of 1903. We are told that after but one year on the Atlantic run the financial results and the fine performances of the vessel in other respects were so gratifying that the North German Lloyd immediately placed an order with the same shipbuilding firm for a similar vessel. The keel for the second vessel, the *Mount Vernon,* was laid in 1905. The vessel was launched in 1906 and placed in service alongside of the *Agamemnon* in the latter half of 1907. Both vessels continued in this service, proving veritable gold mines for their owners, until the beginning of the war brought their careers as a part of Germany's merchant marine to a close.

Vessels Should Be Credited with a Handsome Balance for Transport Service

The entry of the United States into the war brought with it the seizure of both vessels which were subsequently overhauled and fitted out as troop transports. The service these vessels rendered in this respect is too well known for further comment but it may be mentioned that if the vessels were credited with the number of troops carried at the standard troop transportation rate then prevailing we may be assured that the vessels would show a very considerable balance in their favor quite apart from the other services.

The *Agamemnon* was put out of commission as a transport and turned over to the Shipping Board on November 22, 1919, and on the 24th plans and specifications for her reconditioning commenced, the services of Messrs. Kindlund and Drake, naval architects, being engaged for the purpose of making a survey and preparing plans showing the vessel in its present condition. On March 24, 1920, the vessel was sent to the New York Navy Yard where the engines, boilers and auxiliary machinery were thoroughly overhauled, new lifeboats and mechanical davits fitted and other repairs made to the extent of an approximate expenditure of $2,056,000. The *Mount Vernon* was put out of commission as a transport, turned over to the Shipping Board and placed in the Boston Navy Yard to have similar work carried out to the extent of an expenditure of approximately $625,000.

Potential Value of the Vessels Recognized

The International Mercantile Marine Company, knowing these vessels' age and condition, in their bid for the purchase of the ex-German passenger vessels dated January 17, 1920, included one or both in the three proposals submitted showing that a reputable and responsible concern was keen to realize the potential value of a fleet including the *Agamemnon* and *Mount Vernon.*

On May 28, 1920, a contract was entered into between the Shipping Board and the United States Mail Steamship Company whereby that company would acquire a number of the ex-German vessels, arrange for their reconditioning and place them in the transatlantic service; included among these were the *Agamemnon* and *Mount Vernon.* Coincident with the work which was being carried out by the Navy Yards a complete study was made by the United States Mail Steamship Company's technical staff. Plans and specifications for reconditioning the vessels were prepared for restoring in general their original arrangements having in view the appointments desired by the American ocean traveler rather than that of the heavy Continental character which previously obtained. An alternative arrangement was prepared for converting the vessel to burn oil instead of coal for fuel. By August, 1921, this work had progressed almost to the point of obtaining firm bids from the various shipyards when the company, being out of harmony with the board and unable to finance its undertaking, was forced into bankruptcy and the reconditioning of the vessels was suspended.

United States Lines Favored Reconditioning the Vessels

The United States Lines succeeded the United States Mail Steamship Company in the operation of the Shipping Board's transatlantic fleet of passenger vessels. It was not long before it became apparent that it was desirable to augment this fleet with vessels having more speed, greater tonnage and finer appointments than the majority of its vessels then offered; and again the *Agamemnon* and *Mount Vernon,* potential high grade liners, were looked to as being the only suitable vessels which could be placed in service within a reasonable time.

It will be recalled that careful studies of probable revenues and expenditures were made and in one instance published.

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(See Marine Engineering and Shipping Age, January, 1922). All of these were favorable to the reconditioning of the vessels. Later, at the time the Shipping Board was considering the authorization for proceeding with the actual reconditioning of the *Leviathan,* Mr. T. H. Rossbottom, general manager of the United States Lines, was extensively quoted in the press as saying that, if he were given the choice between the *Leviathan* and the *Agamemnon* and *Mount Vernon,* he would choose the latter two, thus indicating the desirability from an operator's viewpoint of having these two vessels in service. It might also be mentioned here that Mr. Rossbottom in his testimony on April 11, 1922, at the joint hearings before the committee on commerce of the United States Senate and the committee on the merchant marine and fisheries of the House of Representatives, said that, if he had the *Mount Vernon* and *Agamemnon* in the North Atlantic service, those vessels could make money in either Government or private operation.

Upon Shipping Board Commissioner Frederick I. Thompson's return from Europe on September 15, 1922, the question of reconditioning these vessels was again brought forward by his advocacy of placing them in service in view of the demand for accommodations on the United States Lines' vessels. Nothing further was done until November 17, when an inspection was made of the *Agamemnon* then lying at Hoboken, N. J. This inspection party was headed by Commissioner M. Lissner and was composed of Messrs. W. J. Love and Joseph Sheedy, vice-presidents; Mr. John Bailey, assistant manager of repairs; Col. R. M. Watkins, operating manager, all of the Emergency Fleet Corporation; Mr. W. F. Gibbs, of Gibbs Brothers, Inc., Mr. Carl E. Petersen and Mr. Wm. L. Bunker, naval architect and superintendent engineer, respectively, of the United States Lines. The excellent condition of the vessel together with its suitability after reconditioning for the passenger service so favorably impressed the Shipping Board officials they decided to direct that a survey be made of both the *Agamemnon* and the *Mount Vernon.*

Board of Survey Appointed

On December 13, 1922, it was announced that the Board of Survey which was to examine the vessels with a view to making recommendations for their future use had been formed. The members of this board were: Mr. W. F. Gibbs, of Gibbs Brothers, Inc., chairman; Mr. Joseph W. Powell, former president of the Emergency Fleet Corporation; Mr. C. F. Bailey, chief engineer of the Newport News Shipbuilding and Dry Dock Company; Captain C. A. McAllister, vice-president of the American Bureau of Shipping, and Mr. Harry Brown, formerly of the Bethlehem Shipbuilding Corporation.

It will be recalled Mr. Powell had, after having retired from the Emergency Fleet Corporation some time previous to this, surveyed these vessels and submitted an estimate of reconditioning costs to Chairman Lasker. Mr. Powell's exact figures were not given out but it is understood that it was estimated that between $5,000,000 and $6,000,000 for both would be required to put them in service as three-class ships but as coal burners. Conversion to oil would require about $450,000 additional outlay per ship.

The Board of Survey proceeded to make a thorough inspection and detailed study of these vessels and their findings and recommendations confirmed all that had previously been stated relative to the condition of the vessels and their suitability for active passenger service. This board estimated that the cost of changing the fueling system from coal to oil and refitting the liners as modern three-class steamers would be from $4,000,000 to $4,500,000 each. The Shipping Board at a meeting on March 14, 1923, instructed Messrs. Gibbs Brothers, Inc., to proceed to draw up plans and specifications so that these could be sent to prospective bidders the first week in June.

An idea of the extensive work called for by these plans and specifications can best be realized by the fact that in the latter part of May the Shipping Board was advised that the cost of carrying out the work specified would certainly exceed $8,000,000 for each vessel whereupon the Shipping Board abandoned the project as proposed and passed a resolution to ask the next Congress to appropriate $24,000,000 to build two new ships.

Shall the Vessels Be Scrapped?

To anyone who has had the opportunity to inspect or carefully survey these vessels he would undoubtedly answer NO to any suggestion of scrapping. The machinery, main engines, boilers and auxiliaries as well as the hulls proper are in a wonderfully well preserved condition; the accommodations in general and the various systems only being in such bad condition as to necessitate complete renewal. The necessity to balance our merchant fleet with vessels of this class together with the fact that these particular ones, so far as the essential vitals are concerned, are suitable for service should preclude serious consideration being given to the suggestion to scrap them.

Shall They Be Sold?

The market at this time for the sale of these vessels is primarily a foreign one. If sold abroad, they would undoubtedly go to German interests who would recondition and place them in direct competition with the United States Lines. In fact, a high official of the North German Lloyd Line has stated that apart from the great differential in reconditioning and operating costs here and abroad that company would, if given the opportunity, waste no time in getting the vessels into active service. For proof of this the reader is referred to what occurred to the S.S. *Pocahontas,* now known as the S.S. *Bremen.*

Shall They Remain Inactive?

It is well known that a vessel in lay-up in spite of extreme care depreciates much more rapidly than when in service. The *Agamemnon* and *Mount Vernon* have been excellently cared for in lay-up until some time ago when the personnel aboard them was very materially reduced as a measure of payroll economy. For reasons of offsetting rapid depreciation and eliminating lay-up costs the vessels should not be continued in their present state.

Should They Be Reconditioned?

The proposal implied by the Shipping Board's resolution to ask Congress to appropriate funds for the building of two vessels to be used in lieu of the *Agamemnon* and *Mount Vernon* would be a very creditable one from the viewpoint of having thoroughly American vessels of more modern proportions and construction were it a certainty that Congress would make this appropriation. If the attitude of Congress toward the merchant marine is properly sensed, there appears to be very little likelihood of its voting funds for additional governmental construction.

Prior to the Shipping Board's resolution an anonymous argument against the reconditioning of the *Agamemnon* and *Mount Vernon* in favor of the building of new vessels was made by a private owner who evidently was not familiar with the provision of the Jones Act prohibiting the board from constructing new vessels from their funds. This same act makes provision for a construction fund from which private American owners contemplating building new vessels can obtain loans at a reasonable interest rate to enable them to finance their projects and to promote construction. It is worthy of note that up to date no owner has made application for moneys from this fund to build vessels of the type under discussion whereas many vessels have been reconditioned.

Now then, if the *Agamemnon* and *Mount Vernon* should

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neither be scrapped, sold nor continued in lay-up, they should necessarily be reconditioned, having in mind reasonable expenditures for this purpose. The factors in favor of reconditioning them may be briefly stated as follows:

1. The crying need for the addition of these or similar vessels for the United States Lines.

2. The fact that new vessels will not in all probability be authorized by Congress; also that, if authorized, at least three years will elapse before these new vessels could be placed in service.

3. The good condition of the vessels, their suitability for the service, as well as their availability for next year's passenger season, if promptly and properly reconditioned.

4. With present first costs, a considerably greater return could be had on the reconditioning investment than on investments in new tonnage.

Suitable Running Mates of the George Washington

Can these vessels with their limitations in size, spaciousness and loftiness ever be considered comparable running mates of the *Leviathan* no matter how much money be expended on them? It would seem, therefore, that these vessels should be reconditioned for running mates of the *George Washington* having first, second and third class passenger accommodations. By removing from each vessel two of the engines, auxiliaries, certain boilers, uptakes and the forward and after funnels and converting from coal to oil burners, a service speed of 18 knots may be had. Reducing the power makes available additional cubic and deadweight for the carriage of oil fuel and is favorable for effectively dealing with any question of stability, no expensive "bulges" or "blisters" being required. The economy of operating at 18 knots instead of 22½ knots should be apparent.

Each Ship Could Be Reconditioned for $3,000,000

With this arrangement nothing like $16,000,000 would be expended in reconditioning, an estimate of $3,000,000, exclusive of steward's equipment, for each vessel would surely be an outside figure of cost at prevailing prices. Any estimate of operating costs which is based on similar ships would show a substantial net revenue after deducting all items, including insurance, interest on investment and a high rate of depreciation, fully justifying reconditioning the vessels as outlined. Fig. 1 illustrates the graceful general character of the vessels after they have been reconditioned on this basis.

Powerful Windlass Built for Submarine Tender

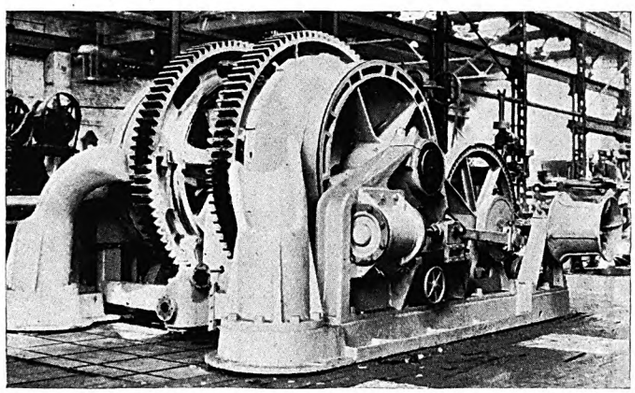
FOR installation on the United States submarine tender *Holland,* which is being built at the Puget Sound Navy Yard, Bremerton, Wash., the Hadfield-Penfield Steel Company has recently completed at its Willoughby (Ohio) works a windlass of sufficient size and power not only to handle regular 2¾-inch Navy standard chain but also to lift the tail of a fleet submarine sufficiently out of the water for the replacement of a propeller if necessary.

Pull of 1,000,000 Pounds Required

When the design of the windlass was undertaken it was found that for the latter purpose the windlass would have to exert a pull of 1,000,000 pounds but in order to get a windlass that would exert a direct pull of this magnitude it was found that the machine would be too large for use on the vessel and, therefore, the designer suggested to the Navy Department that the chain could be led from the wildcat out through the hawser pipe and around a large sheave and then the end of the chain made fast to the bow of the vessel, the sheave to be fitted with a hook to which the chain which was fastened to the submarine would be attached. By this arrangement the actual pull exerted by the windlass would be practically one-half that required to lift the submarine as the sheave would make a 2 to 1 purchase.

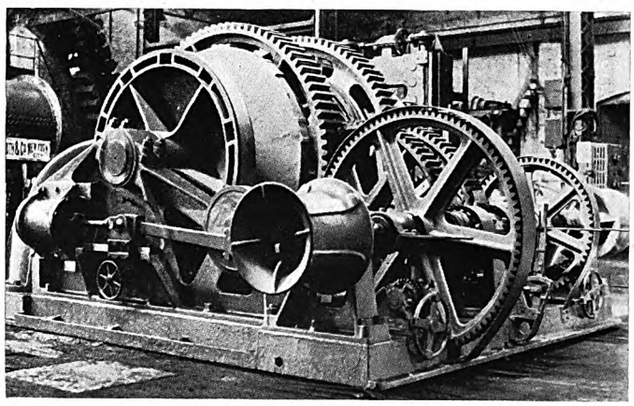
A windlass for handling 2¾-inch chain generally exerts a pull on the chain of about 86,000 pounds when used only for handling the anchor but it will be noted that this windlass must exert a pull on the two chains of something over 500,000 pounds which necessitated designing a special windlass having a ratio of gearing sufficient to produce the required pull.

As built, the windlass has 12-inch by 13-inch double cylinders with cranks set at 90 degrees and the gearing is so



Forward End of Windlass Showing Chain Pipes

arranged that by operating through one set of gears the anchors can be hoisted at the usual rate of speed while by means of clutches this set of gearing can be thrown out of use and another set brought into play which gives the required pull of 500,000 pounds at a very low speed for lifting the tail of a submarine out of water. The overall length of the windlass is 18 feet 1½ inches; the overall width, 16 feet 9¾ inches; the height from the deck to the top of the main gears, 8 feet 4 inches, and the height from the deck



View of Windlass Showing Wildcats and Gearing

to the center of the wildcat shaft, 5 feet. The net weight is 97,800 pounds.

From the illustrations it will be noted that the chain from the hawse pipe passes first under and then around and over the wildcat and down through the chain pipes, to the chain lockers below, as shown on the forward end of the windlass. This is contrary to the usual practice where the chain generally passes over the wildcat and down through the chain pipes directly under the wildcat.

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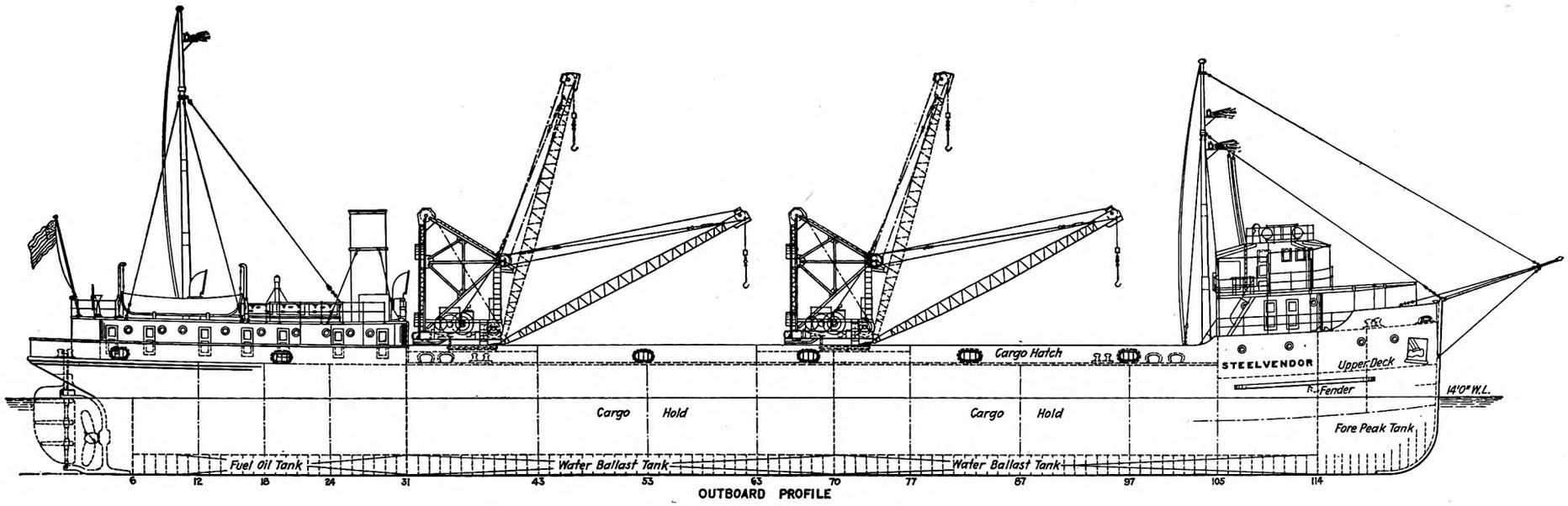
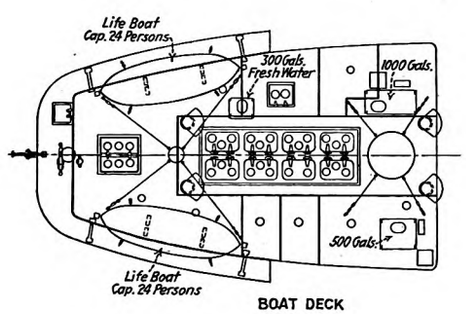
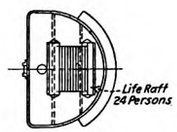


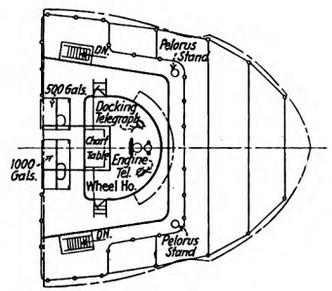
OUTBOARD PROFILE



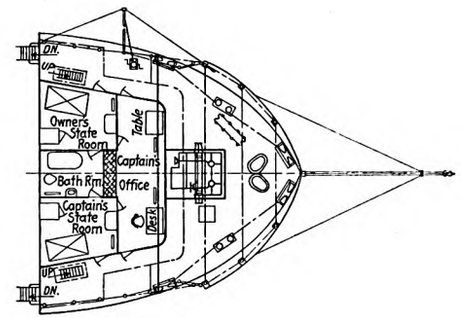
BOAT DECK



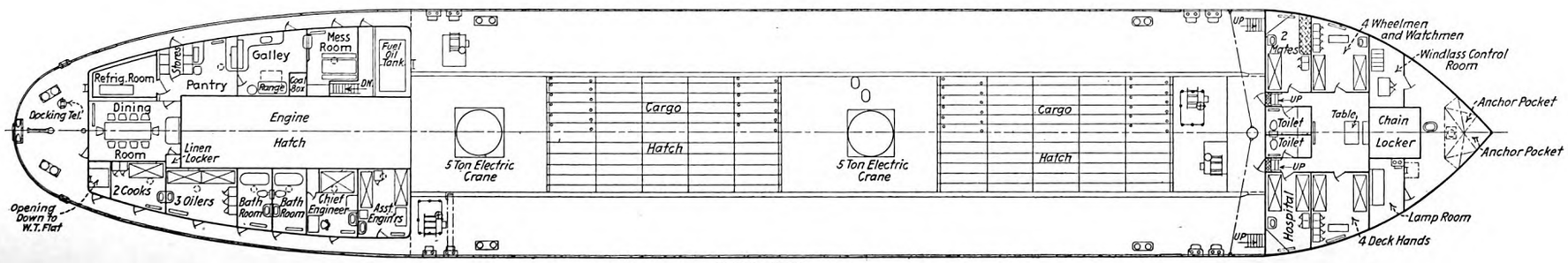
TOP OF PILOT HOUSE



NAVIGATING BRIDGE



FORECASTLE DECK



UPPER DECK

General Arrangement Plans of Motorships Steelvendor and Steelmotor

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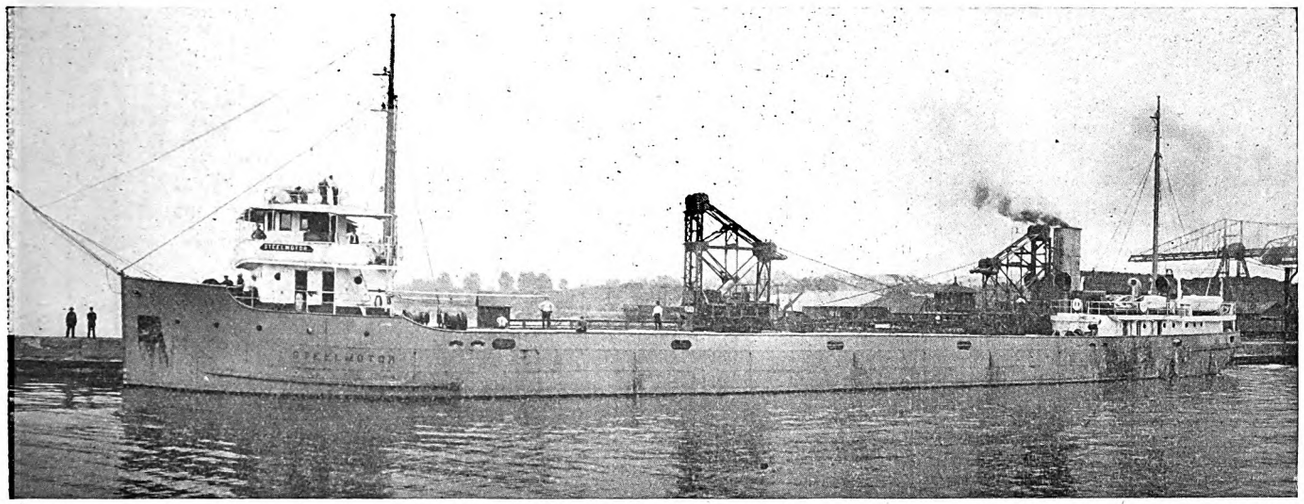


M. S. Steelmotor Built for Isthmian Steamship Company by Federal Shipbuilding Company for Lake and Coastwise Service

Motorships for Both Lake and Coastwise Service

Federal Shipbuilding Company Delivers Two Diesel Engine Driven Lake Freighters Equipped with Special Revolving Cargo Cranes—Will Be Used on Coast During Winter

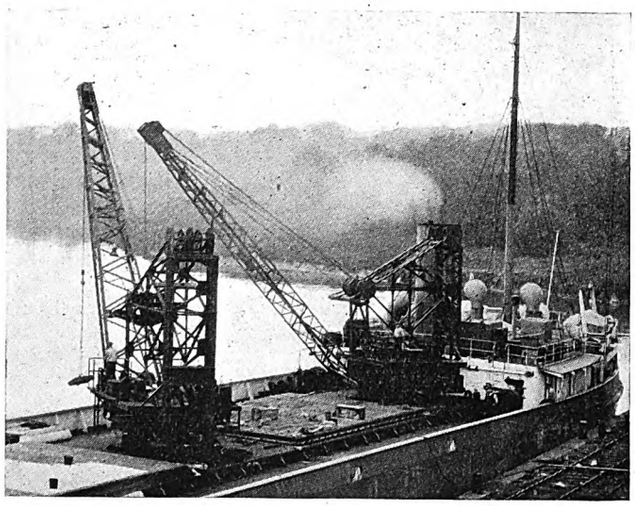
TWO motorships, the *Steelmotor* and *Steelvendor,* designed primarily for service on the Great Lakes and St. Lawrence river, but adapted also for use in the coastwise trade during the winter months, have recently been completed by the Federal Shipbuilding Company Kearny, N. J., for the Isthmian Steamship Lines. These ships were originally intended for the Pittsburgh Steamship Company, of Cleveland, O., but were taken over by the Isthmian Lines, who opened an office in Cleveland for their operation.

The vessels are of the single deck type with raised forecastle, straight stem and elliptical stern. The hulls are built on the transverse system of framing and have a complete double bottom from peak to peak which is utilized for carrying fuel oil and ballast.

Four watertight transverse bulkheads are fitted and the deck is trunked. The vessels were built to American Bureau of Shipping classification A1-E to meet the requirements for both coastwise and lake service. The principal dimensions are as follows:

PRINCIPAL DIMENSIONS

Length overall	258 feet	3⅛ inches
Length between perpendiculars	250 feet	
Beam, molded	42 feet	9 inches
Depth, molded to upper deck	20 feet	
Load draft, canal service	14 feet	
Load draft, coastwise service	16 feet	



For Rapid Handling of Cargo Electric Revolving Cranes Are Installed on Deck

Amidships, the hull is divided into two large cargo holds which are free of all obstructions as no stanchions are fitted. Compensation for the lack of stanchions is made, however, by three deep web beams in each hold. The bilge brackets in the holds are protected from drainage by a double bottom ceiling and the double bottom plating of ½-inch plate, is all flush with seam straps which will make a smooth surface for handling the steel products of which the cargo will be made up. The deck is also specially designed to carry a deck load of steel.

Each cargo hold has an exceptionally large hatch for a vessel of this size, the dimensions being 40 feet by 20 feet. The large holds are fitted so that rails and other steel products up to 65 feet in length can be handled in each hold.

To facilitate the rapid handling of cargo, each of the hatches is served by a 5-ton, 3 motor, variable-radius, fixed-base, revolving crane supplied by the Brown Hoisting Machinery Company and installed at Cleveland. In service these cranes have handled about 100 tons of finished steel products an hour. They have a capacity of 10,000 pounds on a single line with a lifting speed of 130 feet per minute with a 50-foot radius. The maximum hoist under operating conditions is 65 feet.

The cranes are equipped with Diehl motors operating on 240 volts direct current, the hoisting motor is of 50 horsepower, the rotating motor of 25 horsepower and the boom

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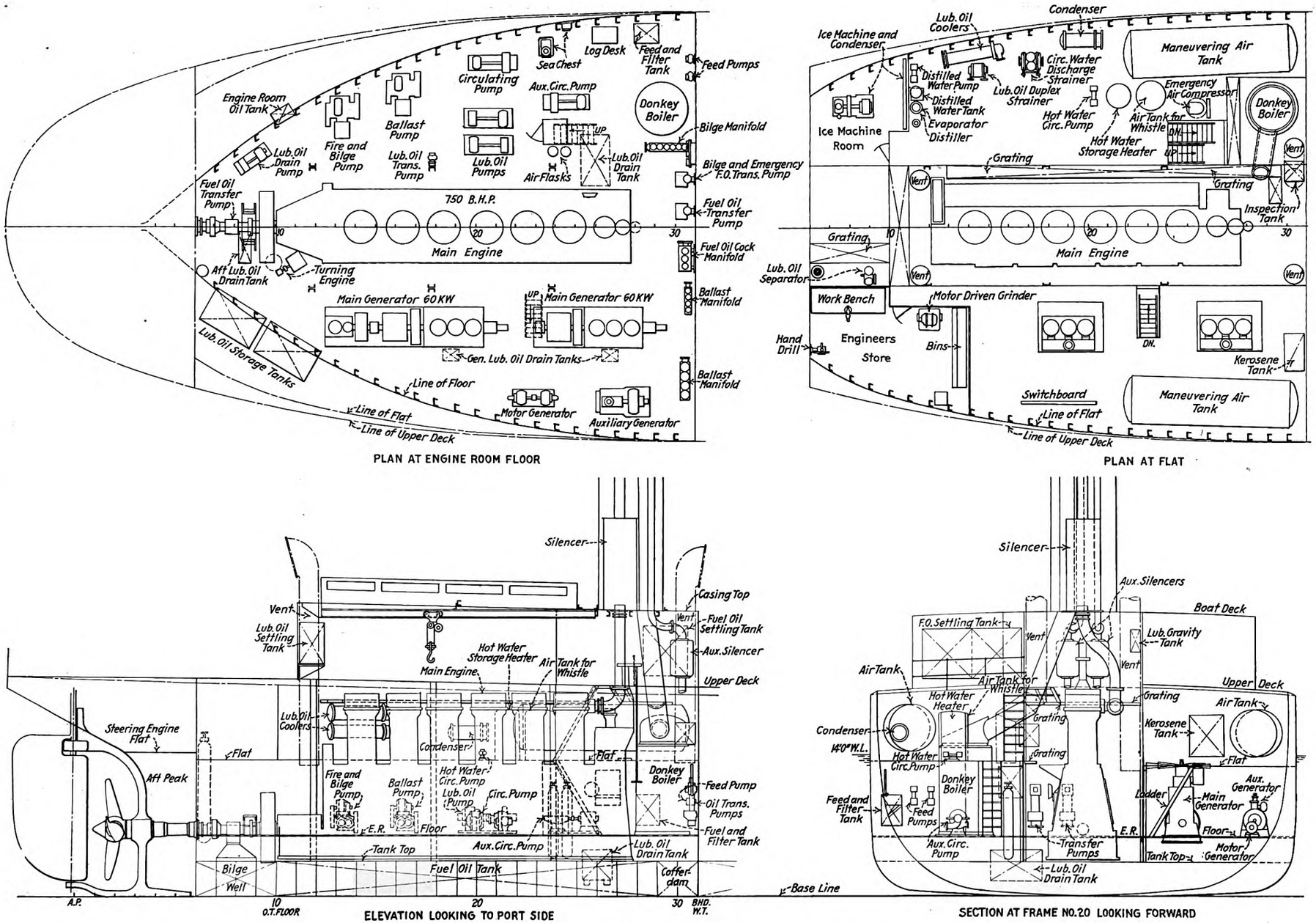

Machinery Arrangement of Motorships Steelvendor and Steelmotor

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motor of 15 horsepower. The hoisting and boom controllers are arranged for dynamic braking when lowering, the rotating motor is braked dynamically in both directions.

One special feature of the cranes is the method by which the booms are stayed on deck. Counterweights are lowered to the bottom of the shaft, unhooked and the boom lowered by means of the lines to the deck. The operation is accomplished rapidly when the vessel is being made ready for use.

Loading and unloading conditions, chiefly in Montreal, are given as the principal reason for the installation of these cranes.

Deck Machinery Electrically Driven

Power for the deck machinery and motor-driven auxiliaries is furnished by two 60-kilowatt Diehl generators driven by Worthington Diesel engines designed to develop 90 brake horsepower at 375 revolutions per minute. One of the generators is connected with an auxiliary Worthington 3-stage air compressor through a Cutler-Hammer magnetic clutch. Electric current for lighting purposes while the vessel is in port and the main generators are shut down is furnished by a 5-kilowatt Diehl generator driven by a Mianus kerosene engine. Two sets of navigating lights are permanently installed, one for use on the Great Lakes and the other for use on the coast.

All of the deck machinery in addition to the revolving cargo cranes is electrically operated, including a Hyde spur gear windlass and four Hyde mooring winches, installed for facilitating the handling of the ship in the Welland Canal and the locks of other canals. A special quadrant-type steering gear is being tried out on one of the vessels while the other is fitted with the regular hydraulic gear with the follow-up gear motor driven. An electrically-driven ½-ton Brunswick ammonia ice machine cools the refrigerating spaces.

Propelling Machinery

As is the custom in lake freighters, the propelling machinery is located aft. In the case of these vessels it consists of a McIntosh and Seymour four-cycle, six-cylinder Diesel engine designed to develop 750 brake horsepower at 135 revolutions per minute, direct connected to the propeller shaft. This power is designed to give the vessel a speed of about 9 knots at a 14-foot draft.

The main engine is of the trunk piston type with cylinders 22 inches in diameter and 32 inches stroke. The thrust bearing is of the Kingsbury type and the propeller is of the 4-blade built-up type of manganese bronze 10 feet diameter by 8 feet pitch.

The lubricating oil system is of the pressure type with a gravity tank provided for gravity lubrication to the bearings. The oil drains from the main engine to a drain tank located in the inner bottom. Two Worthington motor-driven rotary gear pumps each having a capacity of about 125 gallons per minute draw the oil from the drain tank through separate strainers and discharge it through a duplex strainer and two Griscom-Russell multi-whirl oil coolers to the main engine pistons.

Oil for the gravity tanks for bearing lubrication is taken from the pressure system through a valve suitably adjusted to maintain the proper pressure and flow. A settling tank and a De Laval motor-driven oil purifier of about 100 gallons per hour capacity are provided for settling and filtering the oil.

The following tanks are provided for the lubricating oil system:

Two 300-gallon storage tanks.
One 300-gallon drain tank.
One 300-gallon settling tank.
One 30-gallon gravity tank.
Two 30-gallon drain tanks for main generator engines.
One 5-gallon drain tank for emergency generator engine.

Fuel oil is supplied to the fuel oil pumps on the main engine by gravity through a duplex strainer from two 3-ton daily service tanks on the main deck level. A vertical simplex piston pump is provided and so piped that fuel oil may be pumped to or from any fuel oil double bottom tank or service tank.

Injection air is supplied at a pressure of 1,000 pounds per square inch by the attached compressor on the main engine, or the auxiliary compressor—driven by the after main generator engine, or, in emergency, by a Worthington emergency two-stage compressor.

Maneuvering air at 350 pounds pressure is supplied from the excess from the injection air system and by the auxiliary compressor. The air is stored in two maneuvering air tanks each having a capacity of about 250 cubic feet, giving a total capacity sufficient for about 30 starts of the main engine.

Engine Room Auxiliaries

The main pumps are motor driven and comprise the following:

One Worthington ballast pump, horizontal duplex, 7 inches by 6 inches.
One Worthington fire and bilge pump, horizontal duplex, 7 inches by 6 inches.
One Worthington circulating water pump, centrifugal, 4 inches.
One Worthington auxiliary circulating water pump, centrifugal, 2 inches.
Two Worthington rotary lubricating oil pumps, 4½-inch suction.
One Northern Fire Apparatus Company rotary lubricating oil drain pump, 2-inch suction.

All except the lubricating oil pumps are connected to the ballast system and permit ballasting the vessel in a short time. The lubricating oil pumps are of large capacity to offset the piston cooling of the main engine by lubricating oil.

As the vessels are to be used in coastwise service during the winter months, the bilge and ballast systems are arranged for both fresh and salt water service. The other machinery is also suitable for use on either salt or fresh water.

The remainder of the pumps are of the piston type operated by steam or compressed air. These are all of Worthington make and include:

One horizontal duplex distilled water pump, 3 inches by 2 inches by 3 inches.
One horizontal hot water circulating pump, 3 inches by 2 inches by 3 inches.
Two vertical duplex donkey boiler feed pumps, 3 inches by 2 inches by 3 inches.
One vertical duplex lubricating oil transfer pump, 3 inches by 2 inches by 3 inches.
One vertical simplex fuel oil transfer pump, 6½ inches by 7 inches by 8 inches.
One vertical simplex bilge and emergency fuel oil transfer pump, 6½ inches by 7 inches by 8 inches.

An oil-fired donkey boiler with 355 square feet of heating surface is provided to furnish heat and hot water for the living quarters. The donkey boiler stack and Diesel engine exhaust pipes are located in a single smokestack above the machinery space.

The other auxiliaries include a White Fuel oil strainer, an Elliott lubricating oil discharge strainer, an Elliott circulating water strainer, a two-pass surface condenser with 75 square feet of cooling surface, a hot water storage heater, two Griscom-Russell lubricating oil coolers, a Griscom-Russell distilling set, a DeLaval lubricating oil purifier, a Schutte & Koerting injector and an oil burner for the donkey boiler. An extra large ballast line is used in the double bottom tanks. The mechanical telegraph is of a special lake type with an alarm attachment to notify both the captain and the engineer if a mistake is made in the signals.

Quarters for the deck crew are located in the forecastle, the captain and owner have staterooms in the forward deck house and the engine room crew and stewards' department are quartered in the deck house aft on the upper deck.

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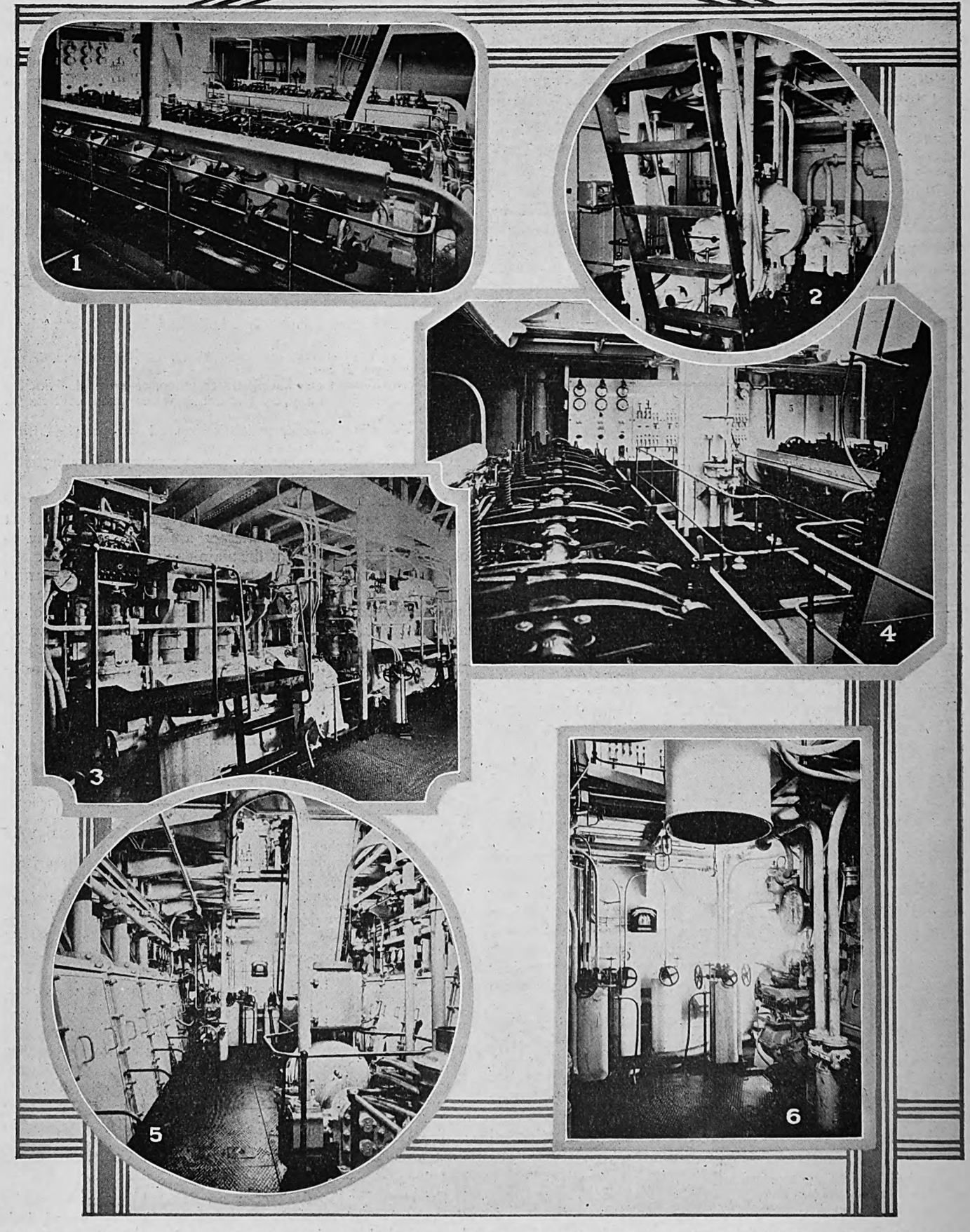

M. S. Crux: (1) Tops of Main Engines; (2) Starboard Side of Engine Room; (3) Auxiliary Engines; (4) Upper Engine Room Platform, Looking Forward; (5) View Between Main Engines; (6) Maneuvering Platform

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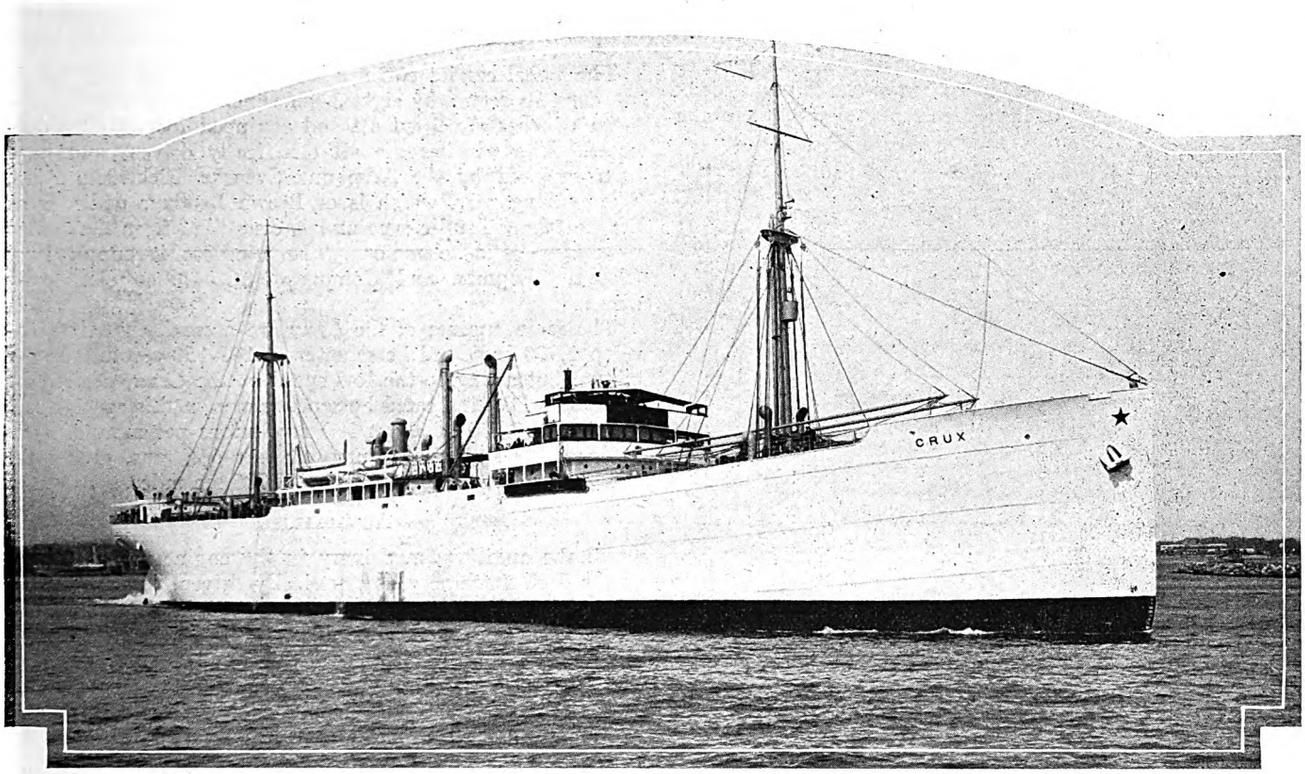


Motorship Crux, of 6,500 Tons Deadweight, Equipped with Burmeister & Wain's New Type Engines

Europe Developing New Types of Diesel Engines

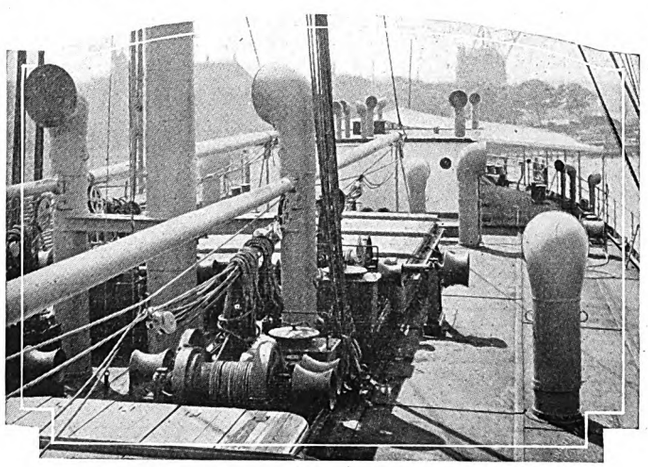
Manufacturers Carrying Out Experimental Work on Double Acting, High Speed and Compressorless Types of Engines

By Our Special London Correspondent

WHEN it is mentioned that some 40 percent of the orders placed for ships in Europe during the past six months are for vessels equipped with internal combustion engines, it will be gathered that shipowners are rapidly becoming convinced of the suitability of motor craft for their various trades. It is a notable fact, however, that Diesel engine manufacturers, even those whose motors have proved their complete success at sea, are all carrying out much experimental work, with a view to developing new and improved types.

It is now a much-debated point in shipping circles whether for vessels up to about 10,000 tons deadweight, single or twin-screw machinery should be utilized. The tendency is undoubtedly towards the employment of one engine, with the consequent saving in cost and upkeep, but some owners still pin their faith to the twin-screw plant.

For such purposes, Burmeister and Wain have recently developed what they term a light engine, examples of which are to be seen in the 6,500-ton motorship *Crux* which they have just built for the Bergen Steamship Company. Apparently with this design they have succeeded in reducing the weight of the machinery to a considerable extent, for the two main engines each of 1,150 indicated horsepower weigh only 162 tons combined. Such a result is only achieved by adopting the high speed of 145 to 150 revolutions per minute but it also has the result of reducing the length of the engine room to 35 feet. The weight given, of course, excludes the auxiliary machinery, shafting, piping, ladders, etc., which bring the total engine room weight up to 312 tons.



Deck View Showing Electrically Driven Winches

Appearance of Engine Changed

In this new engine, the builders have greatly modified the distinctive appearance of the standard Burmeister and Wain design. The camshaft has been raised

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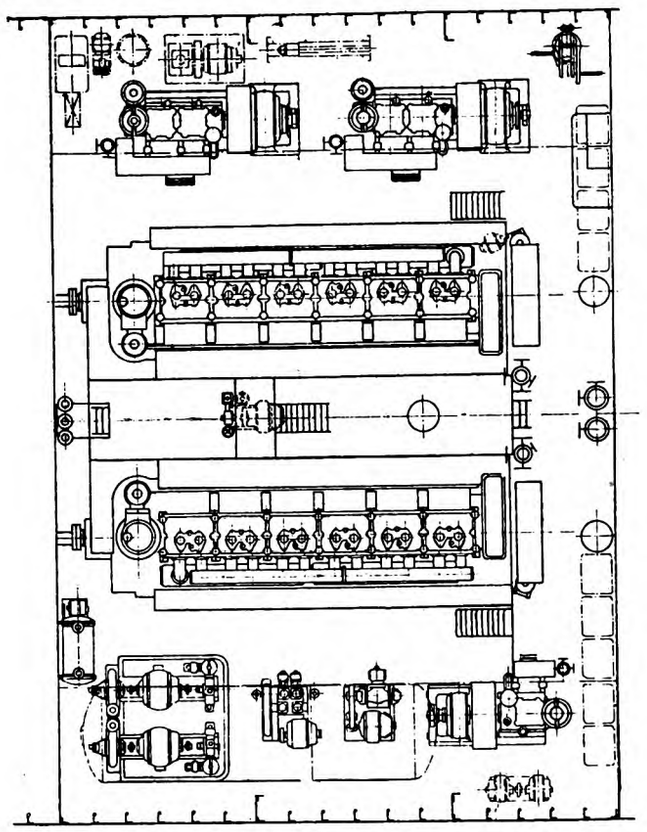
to the level of the cylinder cover, enabling the valves to be operated direct, instead of long vertical push rods being necessary. This has involved a modification of the camshaft drive and all the engine controls have been removed from the center



Plan of Engine Room

of the engine to one end, a similar alteration being effected with the fuel pumps.

Details of the Vessel

The *Crux* has been built to Lloyd's special survey to class 100 A. 1, shelterdeck, according to the requirements of the Norwegian Laws. The principal dimensions are as follows:

Length, overall	382 feet 0 inches
Length between perpendiculars	367 feet 0 inches
Breadth, molded	51 feet 3 inches
Depth, molded to shelterdeck	34 feet 0 inches
Depth, molded to upperdeck	25 feet 6 inches
Height of double bottom	46 inches
Draft, loaded	23 feet 2½ inches
Displacement	about 9,700 tons
Gross tonnage	about 3,828 registered tons
Capacity of holds	about 403,000 cubic feet, grain
Capacity of holds	about 373,000 cubic feet, bales
Water ballast	about 1,210 tons
Total capacity of fuel	about 1,100 tons
Indicated horsepower, normal	about 2,100
Fuel consumption per 24 hours normal	6.5 tons

The ship is built with three complete steel decks, six watertight compartments and double bottom, the double bottom being fitted for the carriage of either fuel oil or water ballast. In a large deckhouse amidships are accommodations for the officers and a limited number of passengers while the crew's quarters are aft.

Electric radiators are fitted for heating the accommodations. For fire extinguishing an apparatus on the A. S. Lux CO_2 system is fitted with pipe connections to all the cargo holds, thus avoiding the use of an auxiliary steam boiler.

Cargo Handling Facilities

The vessel carries two masts and is provided with ten 5-ton derricks served by eight 3-ton winches. In addition two 5-ton winches are fitted aft and equipped for warping purposes. The winches are all electrically driven, and have been supplied by the Allmänna Svenska Elektriska Akto. The steering gear, which is of Brown Brothers make, is of the electric hydraulic type and is controlled from the bridge by means of a telemotor. The windlass is supplied by Clarke, Chapman and Company and is also electrically driven.

The main engines of the *Crux* are normally rated to develop 2,300 indicated horsepower at 145-150 revolutions per minute but owing to the low speed of the *Crux*, desired by the owners, the indicated horsepower was in this special case reduced to 2,100 at about 130 revolutions per minute.

The daily fuel oil consumption is 6-6⅛ tons, giving the vessel a cruising radius of about 45,000 sea miles.

Auxiliaries

All the auxiliary machinery in the engine room, as well as the deck machinery, is electrically driven, the current being supplied by three dynamos, one of 33 kilowatts and two of 66 kilowatts driven respectively by one single cylindered and two twin cylindered auxiliary Diesel engines designed and constructed by Burmeister and Wain. The current for power purposes is supplied at 220 volts, but for lighting and heating purposes this is transformed down to 110 volts by means of a motor generator.

Any one of the dynamos is sufficient to supply the necessary current required for normal working at sea, but two, or even all three, have to be in operation when the vessel is maneuvering in and out of harbor with the maneuvering compressor running or when loading and discharging cargo.

The machinery weights are as follows:

Main engines	162	tons
Auxiliary engines	35	tons
Auxiliary machinery	8.5	tons
Reservoirs	20	tons
Shafting, complete with all accessories including reserve propeller	41	tons
Ladders, grating, floor plates, lifting gear, spare parts, engine room ventilators, telegraph gears, special tools, etc.	20	tons
All piping clear of engine and including bilge and ballast piping, bottom valves, etc.	18	tons
All electrical material inside engine room	3.5	tons
Water in pipings	4	tons
Total	312	tons

Trial Trip

The trial trip of the *Crux* was run on July 9 in the Sound at Copenhagen, when a mean speed of 10.94 knots was obtained with a fuel consumption of 0.284 pound per indicated horsepower hour, the net calorific value of the fuel used being 18,100 British thermal units per pound. The fuel consumption given above includes the consumption of the auxiliary engines producing the necessary current for driving the auxiliary machinery, the steering gear and the electric light.

Another new engine, which the same builders have just developed, is one specially designed for the propulsion of large yachts. The first example is seen in Mr. Edward Hutton's fine 800-ton yacht *Hussar* which is described elsewhere in this issue.

A New High-Powered Submarine Engine

An interesting development has recently been made by the Fiat Company of Turin, who have purchased the Ansaldo San Giorgio Company's Diesel engine works. A two-cylinder experimental submarine engine has been built developing 1,000 brake horsepower or 500 brake horsepower per cylinder.

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It is of the two-cycle type with controlled port scavenging, and its main peculiarity lies in the fact that it is almost wholly of cast steel, except for cylinder liners, pistons, connecting rods, crankshaft and camshaft. It runs at about 350 revolutions per minute and is claimed to have a remarkably low weight to power ratio. The only valve in operation in each cylinder is the centrally-placed fuel inlet valve, apart from the scavenge control valve which prevents the scavenging air being admitted to the cylinder, until the exhaust ports have been partially uncovered by the piston in the course of its downward stroke.

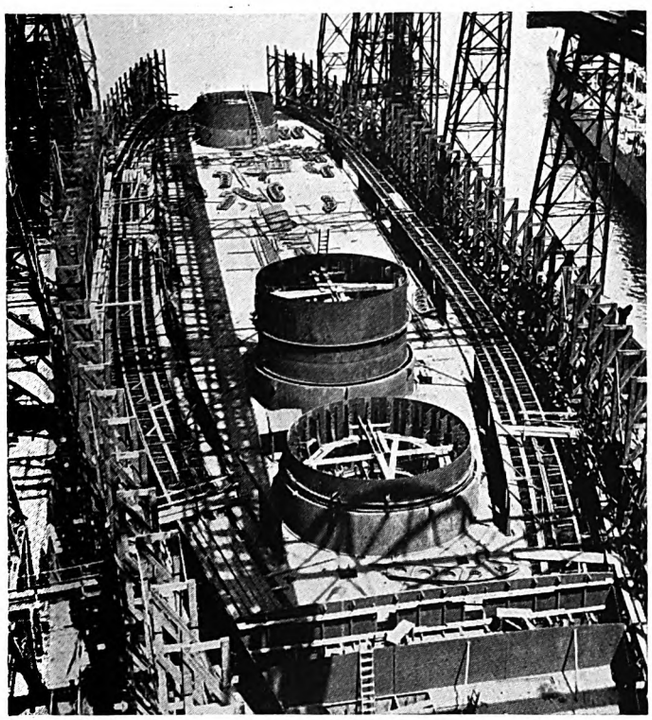
The builders will utilize a somewhat similar design in their mercantile engine of the slow speed type and, with extensive employment of cast steel for the engine crank chamber, cylinder jackets and cylinder covers, has attracted considerable attention, since the tendency has of late been towards the exclusive employment of cast iron for this purpose.

The Fiat Company is about to build its first experimental double-acting two-cycle engine on which plans are now well advanced, and incidentally it may be added that at least half a dozen of the leading Diesel engine manufacturers are now engaged upon this problem. The British Admirality is experimenting with a double-acting two-cycle motor of high power, with the object of its employment for submarine work.

New Engine Placed on Market

After a period of prolonged experiments, a new type of Diesel engine has been placed on the market by Sulzer Brothers which, however, is not intended to replace their ordinary design but is only being built in sizes of 200 brake horsepower and under. It operates on the two-cycle principle and employs crank chamber compression, although the 200 horsepower four-cylinder size is built alternatively with separate scavenging pumps. The main point of importance in the design is the elimination of the injection air compressor. A mechanically operated pump delivers the fuel to a special type of valve in the cylinder head. This is automatic so that there are no mechanically operated valves, while the fuel pump works at low pressure, since the oil is delivered to the valves at the commencement of the compression stroke. This engine on trials has shown a fuel consumption of about 0.41 pound per brake horsepower hour, which is equal to that achieved with much larger motors of ordinary design. The cost of manufacture is considerably less than that of the air injection type, and although it is stated that there is no present intention of building it in large powers for the propulsion of ships, this possibility is by no means ruled out.

Another new Diesel engine is now being standardized by the A. E. G. Works in Berlin for installation in motorships built by the Deutsche Werft at Hamburg. This is virtually a long-stroke Burmeister and Wain design but is of high power, developing 3,000 brake horsepower in six cylinders. It is hoped to construct similar types with still greater output, but where powers of more than 4,000 brake horsepower are required on single-screw ships, no doubt the new Burmeister and Wain double-acting motor will be adopted.

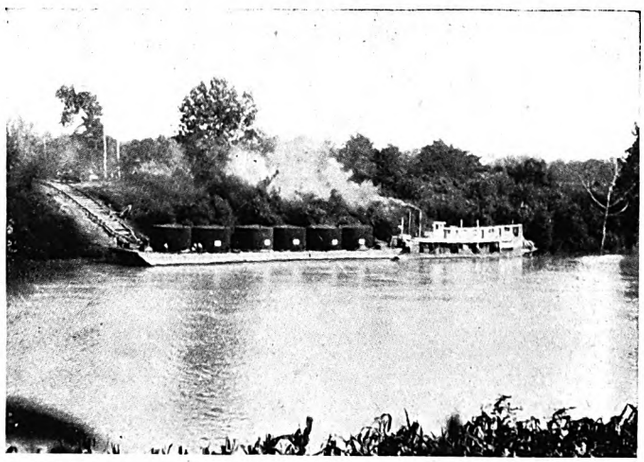


Photograph by Kadel & Herbert, N. Y,

United States Battleship Indiana, Partially Completed at New York Navy Yard, Brooklyn, N. Y., Which Is About to Be Dismantled and Scrapped in Accordance with the International Disarmament Treaty

Inland Waterways Prove Most Economical Means for Transporting Novel Shipment to St. Louis

A NOVEL shipment by water was recently made from the old Hickory Powder Plant at Jacksonville, Tenn., to St. Louis. Six immense tanks already erected at the Old Hickory Plant were purchased by the Monsanto Chemical Works for their Plant B in East St. Louis. As



Tanks Loaded on Barge for Transportation on Western Rivers

these tanks have a diameter of 20 feet and a height of 12 feet, and weigh approximately 13 tons each, their size made it impractical to ship them by rail. It would first have been necessary to dismantle them and later reassemble them in their new location, incurring unnecessary expense. It was possible, however, to ship them by barge without dismantling them.

From the loading point the barge descended the Cumberland River through a series of locks to the Ohio, thence down the Ohio to the Mississippi, which it ascended to East St. Louis, where the tanks were unloaded and installed in their new locations.

The Bureau of Navigation, Department of Commerce, reports 84 sailing, steam, gas and unrigged vessels of 25,217 gross tons built in the United States and officially numbered during the month of August, 1923.

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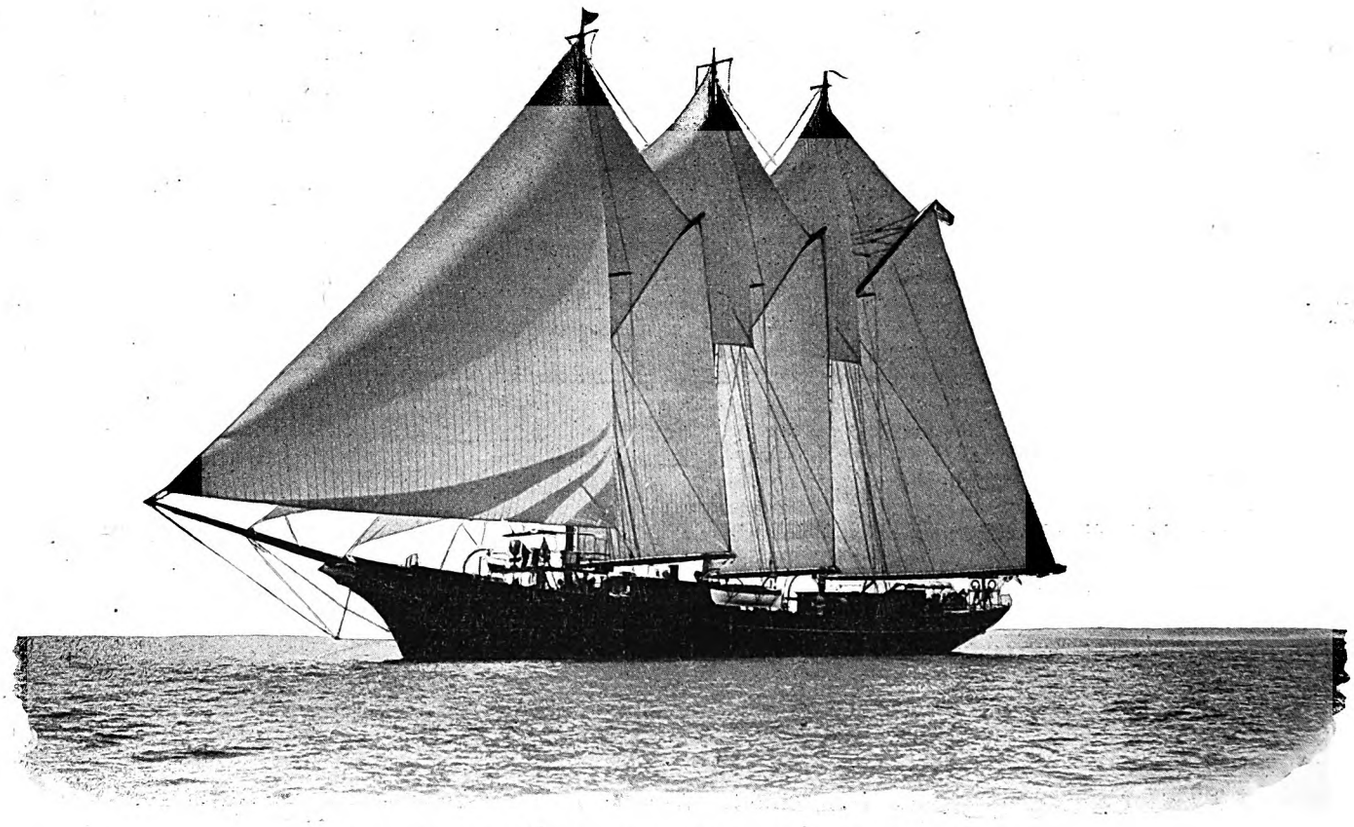

Three Masted Diesel Auxiliary Yacht Hussar IV Under Sail

Diesel Auxiliary Schooner Yacht Hussar IV

Latest Addition to New York Yacht Club Fleet Built Abroad from Designs by Cox and Stevens of New York

ONE of the most interesting events of this year's yachting season was the arrival on this side of the Atlantic of the new three-masted auxiliary schooner yacht *Hussar IV,* designed by Messrs. Cox & Stevens, naval architects of New York, and built under their supervision by Messrs. Burmeister & Wain, of Copenhagen, Denmark, for Mr. Edward F. Hutton, of the New York Yacht Club.

Captain Carl G. Muller, who is in command of the *Hussar IV,* reported that on her trip across she encountered extremely heavy weather but that the new vessel proved herself an excellent seaboat, carried her sail well and made a very quick passage considering the conditions. The weather for the most part was unfavorable, heavy winds and rough sea being encountered, but notwithstanding this fact the voyage from Dover to New London was made in fourteen days, an excellent performance under the circumstances.

General Characteristics

This new schooner is one of the largest auxiliary vessels in the New York Yacht Club fleet, her dimensions being:

Length overall	204 feet 6 inches
Beam	33 feet 0 inches
Draft	14 feet 6 inches
Displacement	826 tons
Indicated horsepower, auxiliary engine	900

She is equipped with a 900 horsepower Burmeister & Wain Diesel engine placed well forward of amidships and driving a two-bladed feathering bronze propeller which when folded into its recess forms practically no obstruction to the speed of the yacht, but when in use can drive the vessel continuously at a speed in excess of 11 knots.

Main Engine

In order to reduce the weight of the engine, the speed has been increased to 300 revolutions per minute and the engine develops 900 indicated horsepower or about 700 brake horsepower. The camshaft is at the top of the engine with ahead and astern cams side by side. Reversal is effected by turning the shaft on which the valve levers are mounted, moving the camshaft fore and aft, and then bringing the valve levers again in contact with the cams, thus allowing the astern cams to come into action. The whole operation is effected automatically by a servo-motor controlled by means of a small reversing lever, and there are two further levers for starting and speed control. This engine is of the trunk-piston type, the cylinders being carried direct on a box-form crankcase.

Auxiliaries

The fuel tanks, located below the cabins aft, have a capacity of 64 tons of oil. The daily fuel consumption with the engine running at full speed is 2¾ tons for all purposes, and the radius of action of the vessel is 7,000 sea-miles, without using the sails. There are two auxiliary Diesel engines, each of 50 brake horsepower and driving a 33 kilowatt dynamo.

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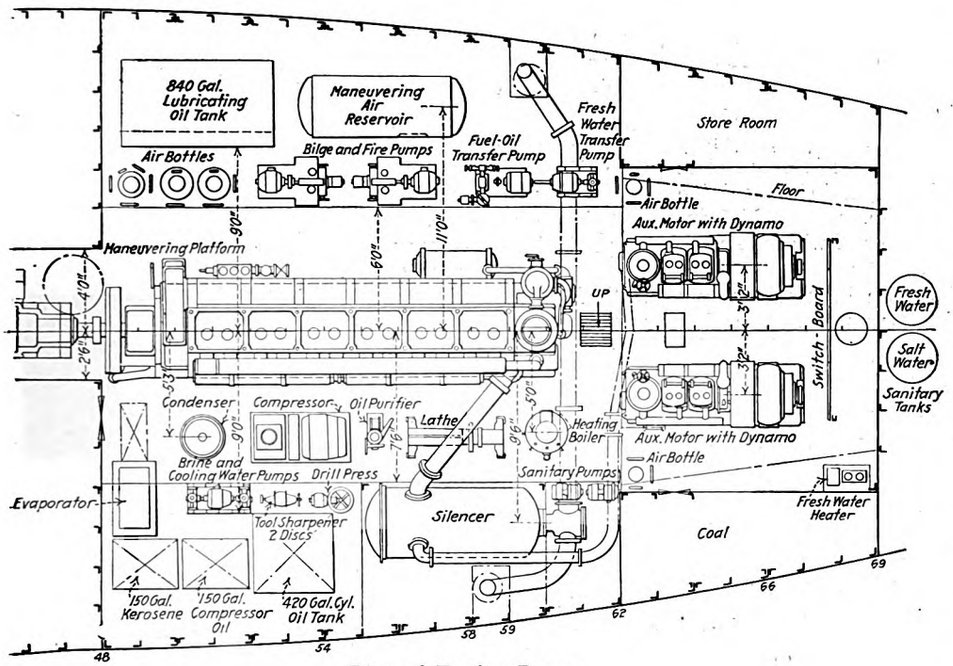


Plan of Engine Room

The other auxiliaries in the engine room comprise electrically driven bilge and fire pumps, fuel oil transfer pumps, fresh-water pumps, a single auxiliary maneuvering air compressor, sanitary, fresh-water, cooling and lubricating-oil pumps, in addition to which a small heating boiler is installed on the starboard side.

The electric light installation comprises about 400 lights, and there is a storage battery of 100 Edison cells, having a total capacity of 300 ampere-hours.

Hull and Rig

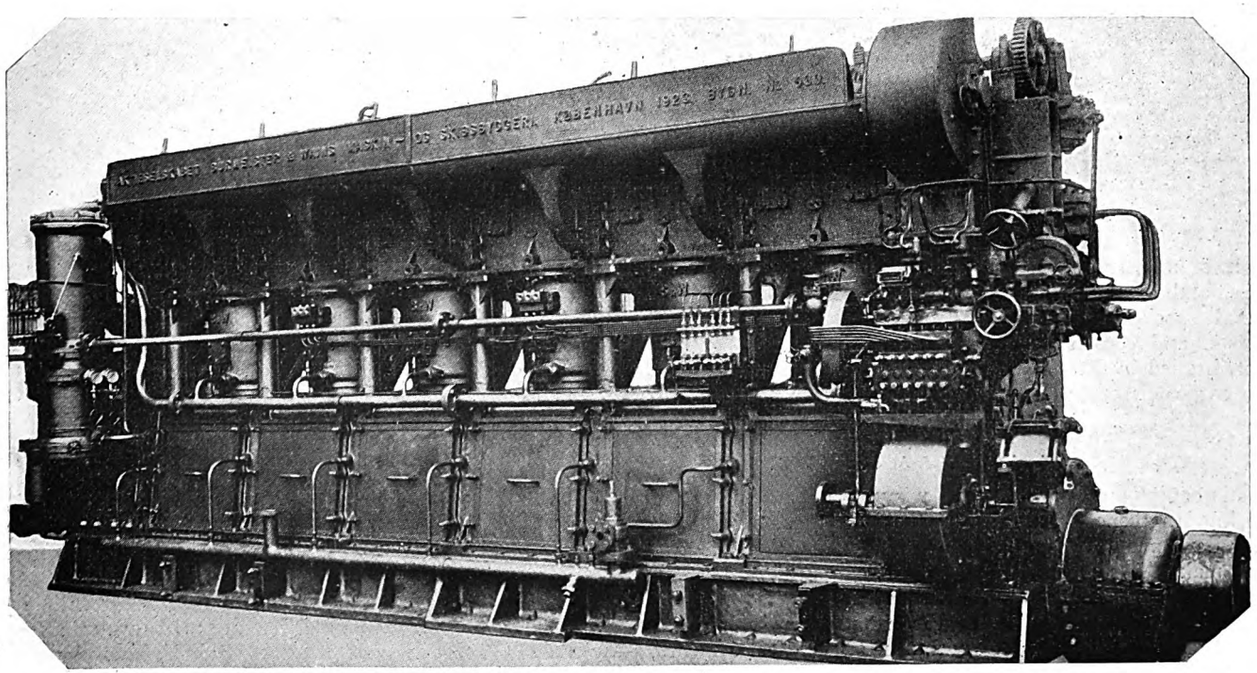
In designing the hull for use on extended cruises, a flush deck vessel with clipper bow and moderate overhang aft was adopted, with a raised poop to provide a dry space on deck for the owner and his guests when at sea in heavy weather. The proportions of the hull were selected with a view not only to comfort and seaworthiness, but also having in mind the serious disadvantage of excessive draft. With the very moderate draft of 14 feet 6 inches the *Hussar IV,* while having an excellent form for driving under sail as well as power, is able to enter any of the harbors which the owner expects to visit.

The vessel was built complete according to Lyold's highest classification for a rugged and substantial craft. The vessel is sparred as a three-masted schooner, having only a moderate sail plan but carrying sufficient canvas so as not to be sluggish when under sail. A rather unusual sparring arrangement was determined upon in order to reduce the size of individual sails, by which the foremast was stepped further aft than usual and four lower head sails are carried, an arrangement that has worked out extremely well. Although by no means under-sparred the masts of this vessel are of such a height that she can pass under the Brooklyn Bridge without sending down her topmasts, which is a valuable asset in the case of a vessel which will be used around New York waters.

The weather deck is of heavy teak planking and the deckhouses, of which there are two, are also of teak, as are the rails, skylights and all other fittings of like character.

The after deckhouse starts at the break of the poop and forms a comfortable living room, affording also access to the owner's and guests' quarters on the lower deck as well as

(*Continued on page* 624)



Six Cylinder Burmeister & Wain Diesel Engine Installed on Yacht Hussar IV

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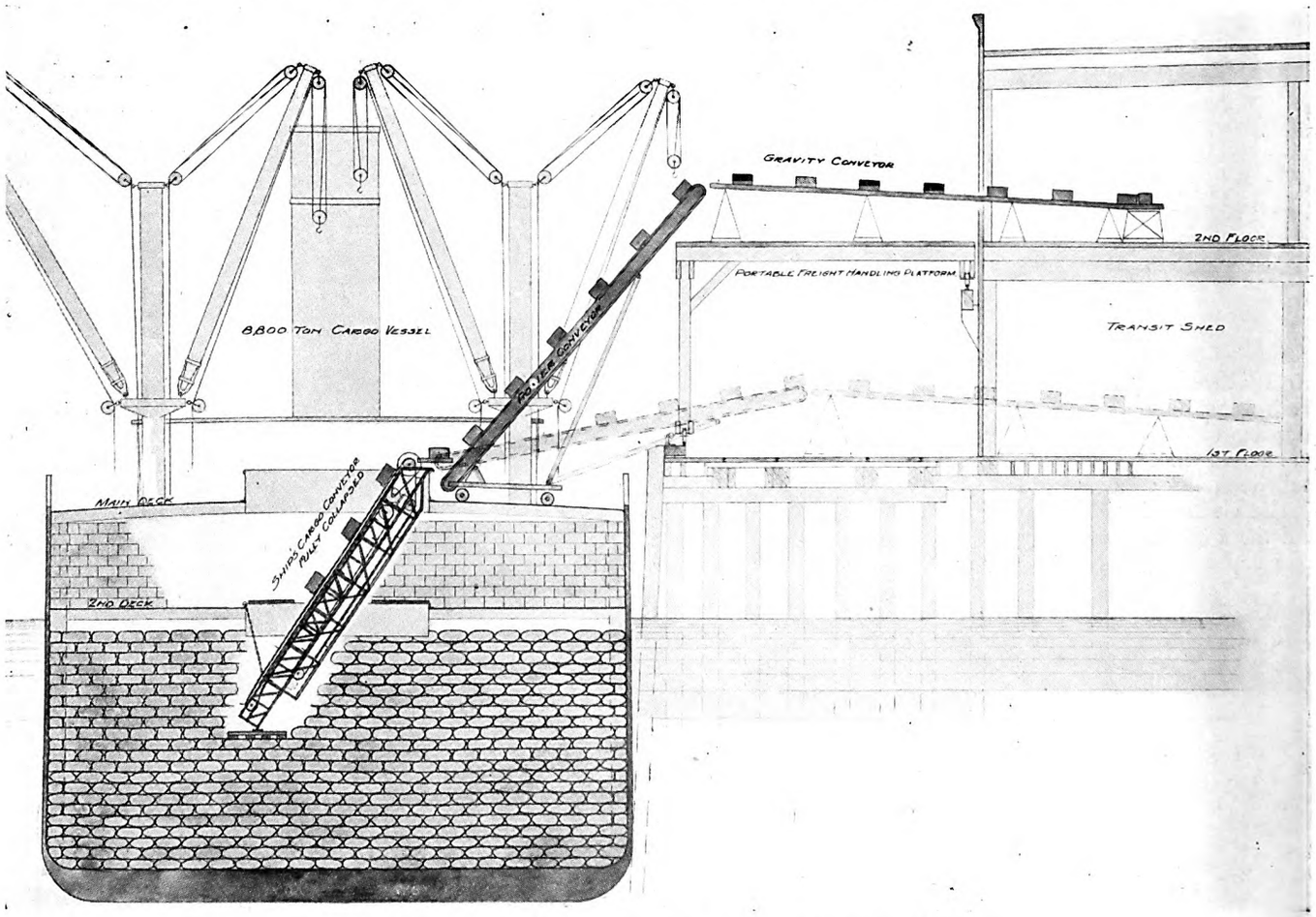
Telescopic Conveyor to Speed Up Vessel Loading and Discharging on Pacific Coast

HANDLING cargo by the old method of ship's sling may be discarded for a new invention that is expected to revolutionize the handling of freight, in the opinion of the Port Commission of Seattle, Wash., whose chief engineer, George F. Nicholson, is the inventor of what is known as a ship cargo telescopic conveyor.

The Port of Seattle, in connection with its planning and construction program of its marine terminal system, has adopted the policy of providing these harbor facilities with the most modern and efficient mechanical handling appliances, and among this handling machinery will be found several specialized labor-saving devices which have been planned and constructed by the port's engineering department, headed by Mr. Nicholson. The latest equipment is a ship cargo telescopic conveyor, which is shown in the illustration.



Sketch Showing Application of Ship Cargo Telescopic Conveyor

A Conveyor Within a Conveyor

This equipment is actually a conveyor within a conveyor, it being lengthened by extending the interior conveyor, this being done not by man labor, but by power, which arrangement makes it very convenient and economical to operate. The length of this conveyor extended is 45 feet and the length collapsed, that is, with the extension raised to the highest point, is 29 feet—the width over all is 5 feet 6 inches, which shows that it is a very compact piece of machinery. It can be supported at both ends, or at one end and the center or at two ends and the center. The estimated weight is 3½ tons and it can be easily handled by the ship's boom. The motor equipment consists of a 10 horsepower squirrel cage, 3 phase, 60 cycle, 440 volt, alternating current induction motor, running at 1,200 revolutions per minute. Silent roller chain drives are used for both conveying and telescoping conveyor.

Loading Capacity Doubled

This equipment has a capacity of 125 tons per hour at a speed of 75 feet per minute and will double the capacity for loading and unloading vessels. With Seattle's present method of unloading canned salmon, for instance, the capacity averages 800 to 1,000 cases, while the new conveyor will handle 2,000 cases. It can handle boxes, bales and sacked goods up to a maximum weight of 500 pounds and to a maximum size of 2½ feet by 5 feet. The commodities that it is expected to handle are cased salmon, cased milk, in fact, cased goods of all kinds, including sugar, beans, rice, etc. In the case of bales over 500 pounds, such as gunny bales, also rattan, bamboo, bulky furniture, etc., these, of course, would be handled by the ship's boom, which can easily be done, as the conveyor only covers a small area of the hatch opening.

Another use that can be made of this type of conveyor is for transferring cargo from one portion of the transit shed to another, and from ship to transit shed and to the warehouse. The estimated cost of this equipment is $2,400 per conveyor, including extension and full equipment. It is expected by the port of Seattle that this will revolutionize on the Pacific Coast the handling of freight from the ship's hold to the wharf and vice-versa, especially Oriental import cargo from the Far East.

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U.S.S. Colorado

Electrically Propelled 21-Knot Battleship Colorado

Capt. Belknap Reading His Instructions

THE U. S. S. *Colorado,* the fifth battleship to be equipped with electric drive, was commissioned for active service in the navy at the yard of the New York Shipbuilding Company, Camden, N. J., on August 30. The *Colorado* is a sister ship of the *Maryland* and the *West Virginia.*

The newest addition to the navy has a length overall of 624 feet; breadth on waterline 97 feet, normal displacement 32,600 tons, the main engines being two 18,000 horsepower Westinghouse turbo-electric generators and four 8,000 horsepower Westinghouse motors, each connected to a propeller shaft. The ship will be an oil burner, developing a speed of 21 knots.

Armament

Like the *Maryland* and the *West Virginia,* the *Colorado* carries eight 16-inch 45-calibre guns, mounted in four turrets. Her secondary battery for defense against destroyers, submarines and other light craft consists of twelve 5-inch 51-calibre guns. In addition, she carries two 21-inch submerged torpedo tubes and eight 3-inch high-angle guns for defense against aircraft. Her complement consists of 1,400 officers and men.

The vessel will be commanded by Captain Reginald Rowan Belknap, U. S. Navy, who recently served on the staff of the Naval War College at Newport, R. I.

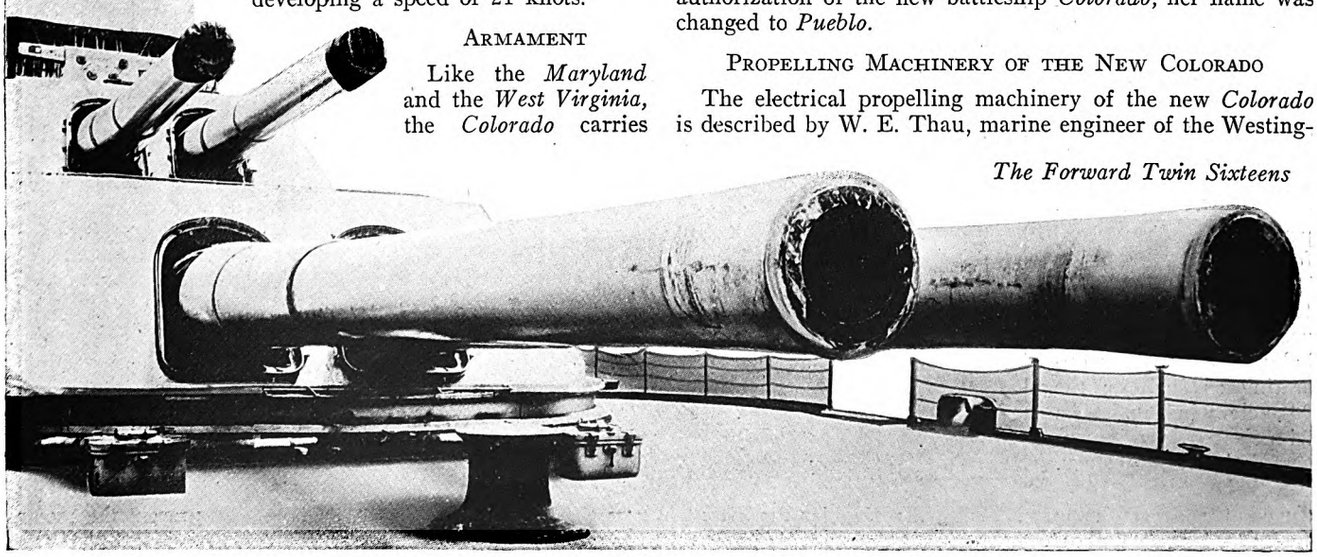
The Three "Coloradoes"

The new battleship *Colorado* is the third ship in the American Navy to bear that name. The first, named for the Colorado River, was a wooden steam frigate of 3,400 tons displacement, mounting 40 guns, launched at the Norfolk Navy Yard on June 19, 1856. The second was an armored cruiser of 13,680 tons displacement and 22 knots' speed with a main battery of four 8-inch guns launched at Cramp's Shipyard, Philadelphia, April 25, 1903. In 1916, with the authorization of the new battleship *Colorado,* her name was changed to *Pueblo.*

Propelling Machinery of the New Colorado

The electrical propelling machinery of the new *Colorado* is described by W. E. Thau, marine engineer of the Westing-

The Forward Twin Sixteens



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house Electric & Manufacturing Company, which supplied the machinery, as follows:

The four propellers are electrically driven by direct connected, two-speed, wound secondary, induction motors, supplied with power by two turbine generator sets. A battery of eight oil fired, watertube boilers supplies steam at 265 pounds gage to the turbines. All engine room auxiliaries necessary to the main propulsion, such as the main condenser circulating and condensate pumps, the auxiliary condenser condensate pumps, the lubricating and governor oil pumps, oil cooler circulating pumps, and the main motor ventilating blowers are electrically driven by direct current motors. The direct current for those auxiliaries necessary to the propulsion, as well as the excitation of the main generators is supplied from one of the three 300 kilowatt geared turbine direct current generating sets in each engine room.

The power generating machinery is located in two engine rooms, one being forward of the other, and both being forward of the control room. The turbine generators are mounted directly above the condensers. On the same flat with the main generators are mounted two 300 kilowatt geared turbine direct current condensing sets and one non-condensing set, all being of the 3-wire type, supplying electric power at 240 and 120 volts. The condensers with their auxiliaries are mounted on the lower machinery flat or pump room. The switchboards for controlling the 300 kilowatt sets are mounted at the ends of the engine rooms.

All control equipment and other apparatus necessary for the complete control of the propelling machinery is contained in the control room, which is located between the engine rooms and motor rooms. The *Colorado* is the first turbine electric driven vessel to have remote electric speed control. All operation incident to the maneuvering of the main turbines, except the actual starting when preparing to get under way, is done electrically from the control room. This is a very unique arrangement, in that it eliminates all mechanical and hydraulic connections between the turbines and the control station.

Main Motors

Each propelling motor is capable of delivering a maximum of 8,375 horsepower at a speed of approximately 185 revolutions per minute. The motors are of the induction type, and are wound for 2-speeds at full frequency, there being a 24 pole and a 36 pole winding. The primary or stator has two independent windings, one for each set of poles. The rotor has a 3-phase, two parallel, star-connected winding, having balancer connections operating as such on the 24 pole winding. The 24 pole winding is connected to three slip rings. When the stator is connected to the 36 pole winding, the balancer connections form short-circuit paths for the rotor conductors, thus forming an ordinary squirrel-cage winding having straps instead of resistance rings to connect the rotor conductors together.

The design of the motors incorporates all special features required by marine service. The mechanical construction of the motor is of the self-contained type, in which the bearings are carried by suitable brackets which fit into recesses in the stator frame. The entire motor is supported by feet cast integral with the frame on either side. The bearing housings are adjustable radially by means of jack screws in the brackets, and, after being adjusted, are bolted rigidly to the bracket.

The ventilation is supplied by duplicate, direct current, motor driven, exhaust blowers, each capable of delivering a maximum of 12,500 cubic feet of air per minute. In addition to these separate blowers, the rotor of the motor is provided with fan vanes which assist in the ventilation, and which are capable of supplying sufficient air to enable operation for brief periods without the separate blowers. The separate blowers are mounted on top of the motors, and are arranged to draw the air through the motors and discharge it through suitable ducts to the deck.

To facilitate inspection and repair, suitable tracks and disassembling gear are provided, which enable the stator to be moved clear of the rotor.

Main Generators

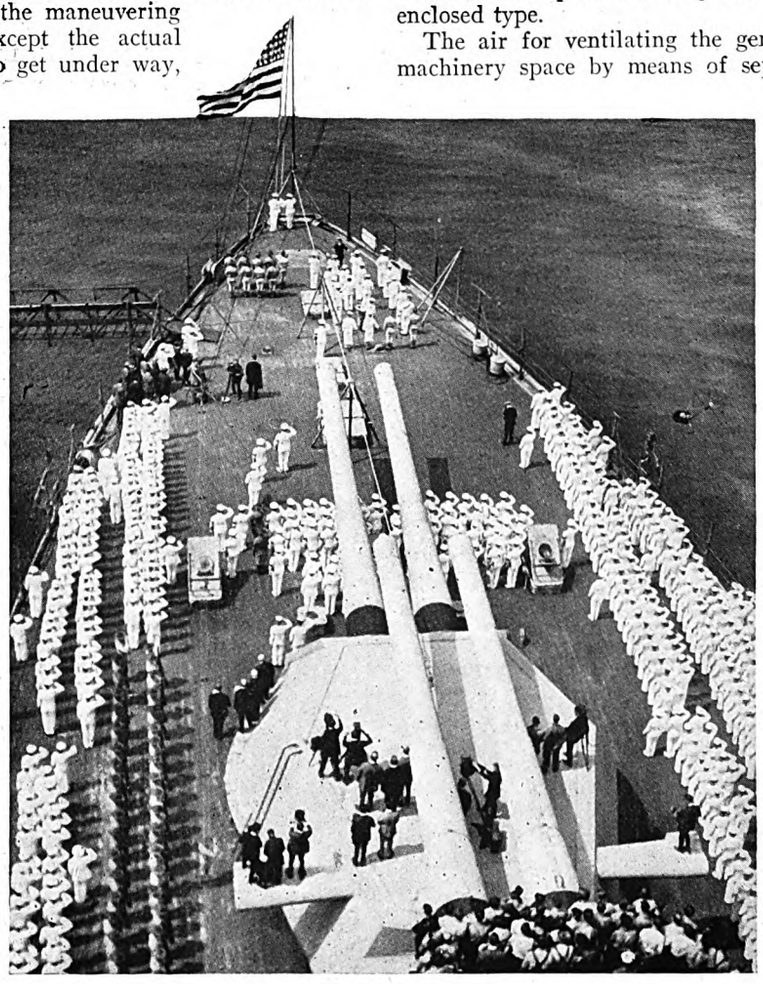
Each main generator is capable of delivering a maximum of 15,000 kva. at approximately 36.5 cycles. The generators are designed and constructed in accordance with standard land practice, except that the rotor is of the totally enclosed type.

The air for ventilating the generators is supplied to the machinery space by means of separate ventilating blowers. The air thus supplied is drawn from the lower machinery space through an inlet at the bottom of the generator, through the end bells, entering the machine at each end of the rotor, and is discharged through an outlet duct to the deck.

The rotor consists of a solid steel forging having radial slots for receiving the windings. The winding consists of a series of turns of bare copper strap and the insulation is entirely mica and asbestos. After winding, the coils are very substantially braced, in order to prevent any possible movement.

The propelling motors and generators are provided with thermo-couples for measuring the hot spot temperatures. These thermo-couples are connected to a central potentiometer board in the control room where the readings may be recorded.

To prevent the motors



Hoisting the Flag for the First Time on the New Battleship Colorado

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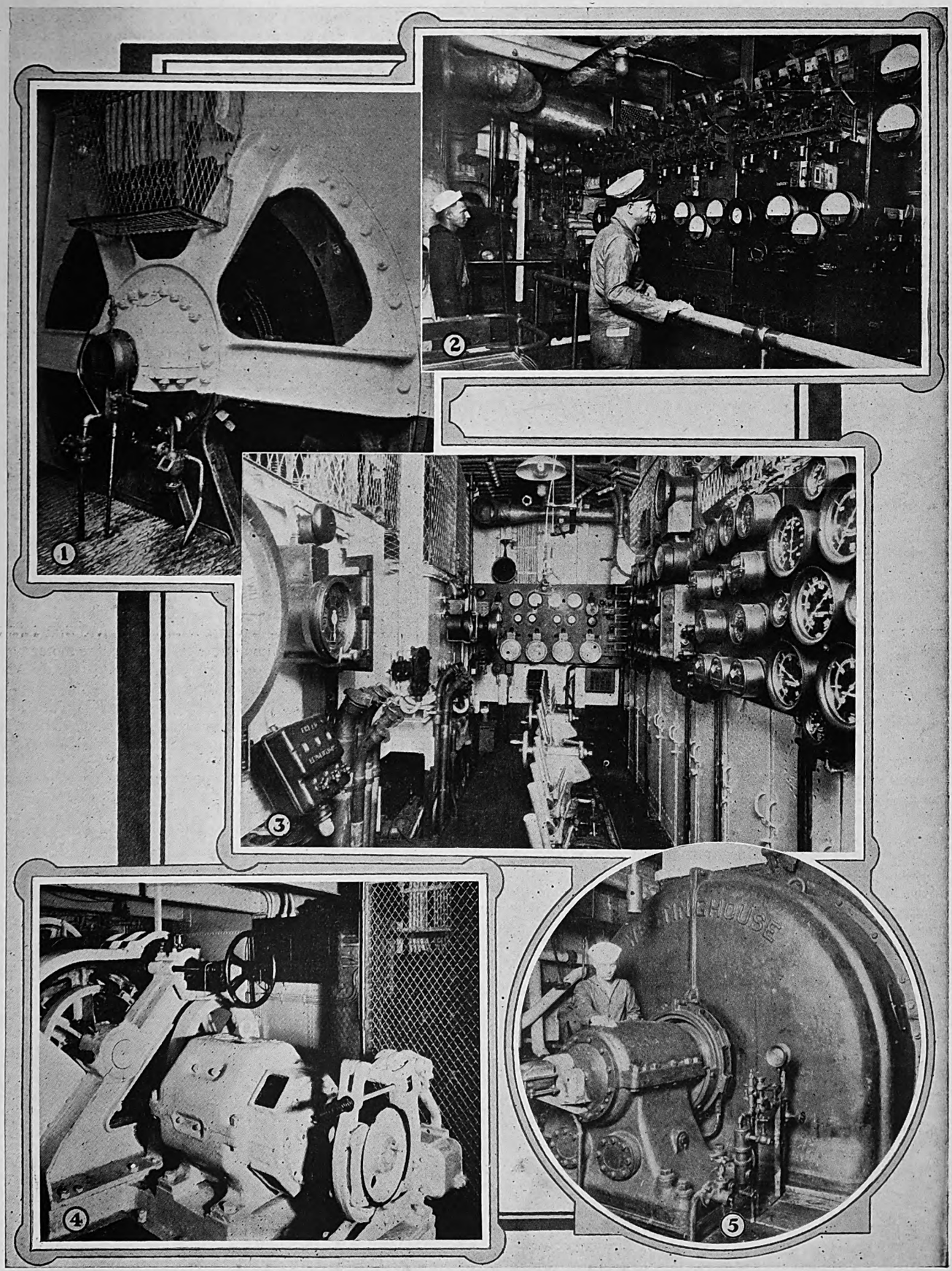

U. S. S. Colorado: (1) One of the 8,000 Horsepower Propeller Motors; (2) Switchboard in the Engine Room; (3) Control Room, Where a Crew of Six Men Ordinarily Handle the Vessel; (4) Motor Driving One of the Ship's Cranes; (5) One of the 18,000 Horsepower Turbo-Generators

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and generators from sweating when idle, heaters are provided, the motors being heated electrically, and the generators by means of steam coils.

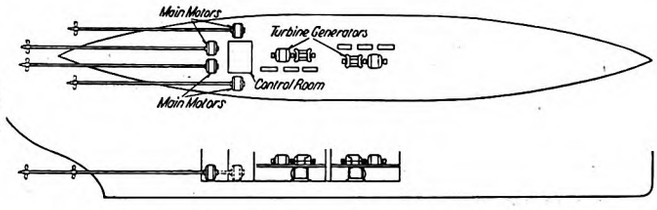
Turbines

The turbine is of the combined impulse and reaction, semi-double-flow type, allowing complete expansion of the steam in one cylinder. An exhaust connection is provided at each end of the turbine, from whence the steam is conducted to a single condenser.

The turbine speed is regulated by the governor valve only, hand valves being used merely to obtain the best economy, and to prevent overloading the boilers at various standard speeds.

Speed Control

Briefly, the speed control system consists of a governor driven directly from the turbine shaft through suitable gearing. The governor is essentially a dead weight governor, in



Sketch Showing Location of Propelling Machinery

which the dead weight is replaced by a hydraulic piston, resulting in a type of governor capable of functioning over a wide range of speed by varying the hydraulic pressure on the piston. The speed is adjusted hydraulically by means of a motor operated control valve in the engine room, which regulates the oil pressure. The control for the motor which operates the valve is located in the control room, and hence enables the speed of the turbine to be adjusted electrically from the control room. The position of the speed control element is transmitted electrically to an indicator in the control room, thus enabling the operator at all times to know the position of the turbine speed control system. A double seated poppet valve located on the main steam inlet to the turbine is controlled through a floating lever oil pressure relay system from the main governor, and this valve controls the amount of steam as required to maintain the speed for which the system is set. The governor control valve is also operated through a suitable oil pressure relay by a separate over-speed governor secured to the end of the turbine shaft. In addition, this over-speed governor also operates the main throttle valve in case of necessity.

In order to limit the power input to the turbine on overload conditions to an amount which will prevent excessive overloads on the machinery, and also prevent priming of the boilers, a power limit stop is provided. This is arranged to limit the travel of the governor linkage in the direction which admits more steam. The position of the stop is adjusted electrically from the control room through a system of gearing operated by a small motor. In order that the operator may know when the governor control system is approaching the setting of the power limit stop, an arrangement of pilot lights is provided. The switches for these lights are so arranged on the governor linkage that a white light indicates the position for which the stops should be adjusted; a white and red light indicates when the governor is approaching the limit of the stop; and a red light indicates when the stop has been engaged by the governor linkage.

In operation, this system functions as follows: The speed of the ship is set from the control room for any given standard by means of the hydraulic speed-control system. The power limit stop is then adjusted to limit the motor speed to a few revolutions above that corresponding to the standard speed. Should an overload occur from turning or from any other cause, the speed-control governor will tend to maintain a constant speed by admitting more steam. However, as the governor linkage has only an additional limit of travel corresponding to the few revolutions increase in motor speed, the steam which can be admitted to the turbine is, therefore, limited, and consequently the overload has a fixed value for any given condition.

By providing the motors with two sets of windings, more economical operation can be obtained at low speed than would be the case with a single winding motor. For a given motor connection, the propeller speed is varied in the same manner as in the case of a geared turbine drive, that is, by throttling the turbine. The double winding on the motor thus permits the turbine to be operated at relatively high average speeds for cruising and full speed conditions. This arrangement, together with the arrangements for carrying the load of all four screws on a single generator at reduced powers, results in fairly flat steam consumption rates for all operating conditions.

Main Control

As in the case of any other drive, the control for the electric drive is operated under orders from the bridge. All controlling apparatus necessary for the operation of the propelling machine is either located in the control room, or arranged for remote operation from the control room, except the actual starting of the turbines when preparing to get under way. The main circuits are handled by means of manually operated oil circuit breakers. All circuit breakers

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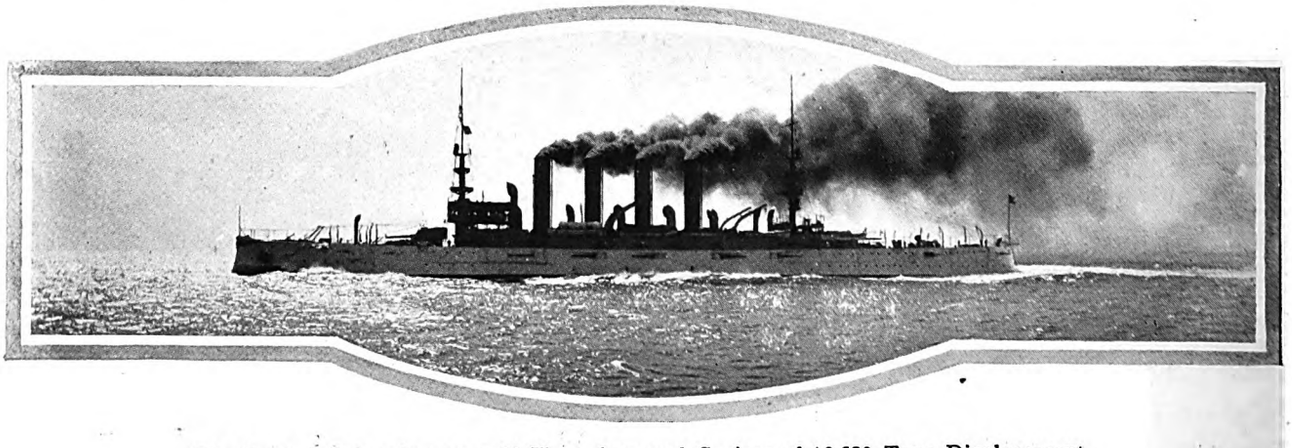

The Second Colorado was a 22-Knot Armored Cruiser of 13,680 Tons Displacement

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Why Americans Pay Greater Panama Canal Tolls

Shipowners, Captains of Vessels and Naval Architects Have Not Learned to Take Full Advantage of Our Tonnage Laws

By M. C. Davis*

THE statement has often been made that an American ship pays more tolls to transit the Panama Canal than a British or foreign ship of the same deadweight tonnage. This statement unfortunately is true, and the purpose of this article is to explain the reason for it, and also to suggest a remedy.

At the time of the construction of the canal, Professor Emery R. Johnson was directed to compile a set of rules of measurement which would be impartial to all vessels, with a view of using them for the assessing of tolls for this canal. It might be said here that these rules are the fairest and most impartial ever compiled with regard to measurement of vessels. They are called "The Measurement of Vessels for the Panama Canal."

The President's Proclamation of November 13, 1912, stated that merchant vessels carrying passengers or cargo would be charged $1.20 per net vessel ton, each consisting of 100 cubic feet to the ton.

The Act of Congress of August 24, 1912, provided that tolls may be based upon the gross or net registered tonnage, but based upon the net registered tonnage for ships of commerce the toll shall not exceed $1.25 per net registered ton.

Must Be Measured in Accordance with Rules

This matter was referred to the Attorney General who ruled that the $1.25 net ton meant: $1.25 times the U. S. net registered tonnage for American vessels and its equivalent for foreign vessels. The result of this is that a vessel is charged $1.20 times her Panama Canal net tonnage (as derived by the rules called "The Measurement of Vessels for the Panama Canal") provided this amount does not exceed $1.25 times the vessel's U. S. net registered tonnage or its equivalent in the case of foreign vessels as found on board the vessel at the time that she makes application for transit through the canal. This does not mean that the vessel's tolls will not exceed $1.25 times her U. S. net register, unless the different spaces in the vessel are in strict accordance with the U. S. rules for measurement of vessels and the latest rules, decisions and interpretations of the Commissioner of Navigation. A vessel whose American register shows her net tonnage to be 5,000 tons, may be charged as high as 6,500 tons for her transit through the canal, this difference being due to the fact that the captain is not familiar with the rules. For instance he might have had hinges placed on the tonnage opening plates or inserted gaskets therein, thereby disqualifying the entire space from exemption and at the same time decreasing the propelling power allowance by several hundred tons.

As has been previously stated, the rules called "Measurement of Vessels for the Panama Canal" in themselves are fair and impartial and they need no further comment in this article. The U. S. rules of measurement for vessels, however, have a large number of loop holes whereby the net tonnage on the register may be decreased by conforming to certain technicalities of these rules. As the tolls for a vessel transitting the canal cannot exceed $1.25 times this net register, it is apparent that the lower the net tonnage shown on this register is, provided said spaces are in accordance with the rules, the less tolls the vessel pays in transitting the canal. These rules provide that if certain spaces on board a ship have certain means of closing, which, technically are not watertight, the entire space shall be exempt from the gross and net tonnage of the vessel. In this respect the rules are practically an exact copy of the British rules, with the exception of the exemption on passenger vessels of cabins or staterooms situated on or above the first deck, which is not a deck to the hull. In this the American rules go the British one better in the exemption of all cabins and staterooms situated in these spaces.

Spaces That Can Be Exempted on Cargo Vessels

The spaces that can be exempted on cargo vessels when properly fitted with tonnage openings are: The forecastle, bridge and poop when said spaces are fitted to carry cargo in this type of vessel; and the entire shelter deck where fitted to carry cargo in the case of shelter deck vessels.

Bridge Space

This space, when added to the register is the largest one which can be exempted in the "three island" type of vessel. This usually runs from 300 to 600 tons. When this space is included in the register, the vessel usually obtains what is called the 175 percent propelling power deduction which means the actual space of the engine room and fireroom including shaft-alleys and escapes, and a portion of the space above the fireroom and engine room when properly certified and authority obtained from the Commissioner of Navigation for adding same and 75 percent of this total space in addition for bunkers. This deduction is from 200 to 800 tons less than the 32 percent propelling power deduction, which means 32 percent of the gross tonnage of the vessel. The application of this deduction will be taken up later in this article. However, it can readily be seen that when a vessel has the bridge space included and the 175 percent propelling power deduction, it would be of great advantage to the ship to have the tonnage openings installed, thereby exempting the entire space and also obtaining the more advantageous propelling deduction, namely, 32 percent of the gross tonnage.

Does Not Bar Carriage of Cargo

It must be understood that when tonnage openings are fitted to these spaces, they do not bar the carrying of any kind of cargo in this space as they are for the express purpose of making these spaces technically comply with the law regarding them. The question might readily be asked here: Why do they not change such a law? The answer is: That England and other foreign countries, many years ago adopted this method in order to encourage their merchant marine thereby reducing the harbor dues, lighthouse, wharfage and other dues in foreign countries where they are based on the gross or net tonnage of the vessel. The only thing left for the United States to do out of self-protection was to adopt similar rules for its vessels.

The writer has reduced the tonnage on some vessels of this type as high as 1,200 tons by simply having these tonnage openings installed, thereby saving the operators $1,600 on each and every transit through the canal; and the difference due to the reduction of this tonnage in harbor dues, dry docking and so forth in all cases where the charges are based on the gross or net registered tonnage.

* Formerly chief admeasurer, Pacific entrance to Panama Canal.

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The entire space in the bridge can be exempted with the exception of any space within it which is entirely closed in, such as a storeroom or refrigerator room. Machine shops and refrigerating machinery located in this space are exempted under the rule which exempts all machinery above the tonnage deck. In order to have this space exempted, it is necessary to install two tonnage openings in the after end of the bridge either in the bulkhead or in the two after-doors when they are large enough to permit the installation of openings of the size required by law. These requirements are that this opening must be not less than 3 feet wide and 4 feet high and that the bottom of the opening must not exceed 24 inches from the deck. It might here be stated that the American Bureau rule required that this opening must be at least 18 inches from the deck so this leaves a lee-way of 6 inches in which to lay off the bottom of the opening.

This opening can be closed by a steel plate preferably of

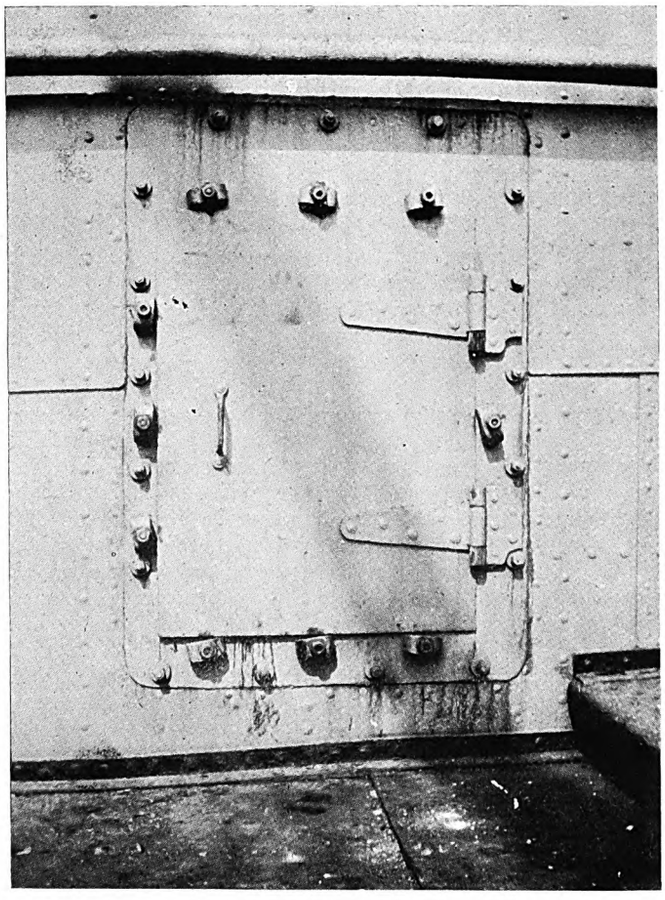

Fig. 1.—Method of Obtaining Exemption and at Same Time Retaining Access by Door in Tonnage Opening

the same thickness or thicker than the bulkhead or door where it is cut out. Angle-iron stiffeners must be installed on the inside edge of the opening with the toe of the angle placed next to the opening. The plate must be held in place by hook bolts, the hook of which grasps this angle-iron. The hole for these bolts must only be through the plate and not in the bulkhead and must be spaced not less than 12 inches apart, measuring across the shortest distance from center to center. One of the most serious mistakes that have been made in this connection has been the spacing of these bolts 11¾ or 11⅞ inches apart. *One bolt thus spaced disqualifies the entire space from exemption,* due to the fact that the rule says that the opening must be at least 3 feet by 4 feet and that it is impossible to get four bolts across the top spaced 12 inches apart. It is, therefore, advisable to make the

Comparison of Tonnage before and after Installing Tonnage Openings in Bridge Space of S. S. John Adams.

	Before.		After.
Underdeck tonnage	7,203.09		7,203.09
Forecastle	112.56		112.56
Bridge	567.50		91.20
Poop	69.76		69.76
Round houses	186.51		186.51
Chart houses	7.17		7.17
Radio houses	4.73		4.73
Excess hatchways	48.20		50.58
Light and air	89.69		84.13
Gross tonnage	8,289.21		7,809.73
	Deductions.		
Crew's space	237.37		237.37
Master's cabin	26.50		26.50
Anchor gear	16.40		16.40
Boatswain's stores	49.17		49.17
Chart house	7.17		7.17
Radio house	4.73		4.73
Propelling power (actual space) 175%	1,800.01	32%*	2,499.11
	2,141.35		2,840.45
Gross	8,289.21		7,809.73
Deduction	2,141.35		2,840.45
Net tonnage	6,147.86		4,969.28
	4,969.28		
Net saving in tonnage	1,178.58		

*By this alteration the engine room space was made to exceed 13 percent of the new gross tonnage, thereby allowing the vessel the 32 percent propelling power deduction.

opening 38 inches by 50 inches, thereby gaining 2 inches to allow for the thickness of the bolts.

Gaskets Cannot Be Used

Extreme care should be exercised in cutting the openings of the plate and the fitting of the angle-iron in order to see that they are as true as possible. Under no condition can gaskets of any nature be used. Not even a red lead and putty gasket can be used in making up this joint. There is, however, no objection to a coat of red lead being applied as a preservative of the metal. Under no condition is this plate to be fitted with hinges as it then becomes a permanent means of closing and is immediately disqualified as a tonnage opening.

In the event that there is a center line bulkhead or partition within this space, a similar opening must be installed or one in which two channel irons are fitted at the sides of the opening and closed with suitable shifting boards. If desired this method can be used instead of the steel plates in the after bulkheads. This method is almost universally used for tonnage openings in British vessels. However, *the fitting of both methods in the same space has recently been ruled by the Commissioner of Navigation as sufficient reason to disqualify this space from exemption.*

When the watertight doors on the after end of this space are of sufficient size, the steel plates may be fitted in same as shown in Fig. 2. This method has been approved by the Commissioner of Navigation and qualifies the space for exemption. At the same time it furnishes a ready means of access to the exempted space. In the event that it is impossible to fit two of these openings in the after end, one opening may be fitted in the center of the bulkhead or on the side, provided there are two freeing ports on each side at least 18 by 18 inches and a suitable number of scuppers, three on each side being considered a suitable number, draining from the above-mentioned space. When the space is so fitted, it will be entitled to exemption.

It will be noticed that no mention has been made for tonnage openings on the forward end of the bridge space for

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the reason that the rules only require two openings to qualify the space for exemption. It is difficult to make openings in the forward bulkhead tight enough to prevent water getting in, as it is exposed to the more severe action of the sea in rough weather.

FORECASTLE

In order to exempt a portion of this space, it is necessary that it have a large space suitable for cargo and not occupied by quarters, lamp room, boatswain's stores and so forth. As a rule this space is not sufficient to warrant an installation of tonnage openings except in the case where the bridge space and possibly the poop have been exempted, and there is not sufficient space in the engine room, fireroom and space above these which is called, "light and air," to qualify the vessel for the 32 percent propelling power deduction. If it is necessary to exempt this space, it can be done by installing the same type of tonnage openings described above and in accordance with the instructions for installation of the same in the bridge space. In case, however, that only one opening is fitted, either in the center or on the side, it only requires scuppers and not freeing ports.

POOP

This space, like the bridge and forecastle, may be exempted, if the cargo space is large enough to warrant the installation of tonnage openings, in which case openings as described above for the bridge may be installed as required. The same exception applies where one opening is fitted as is specified above for the forecastle.

The classification society, however, requires that the openings in this space be fitted with shifting boards and channel irons.

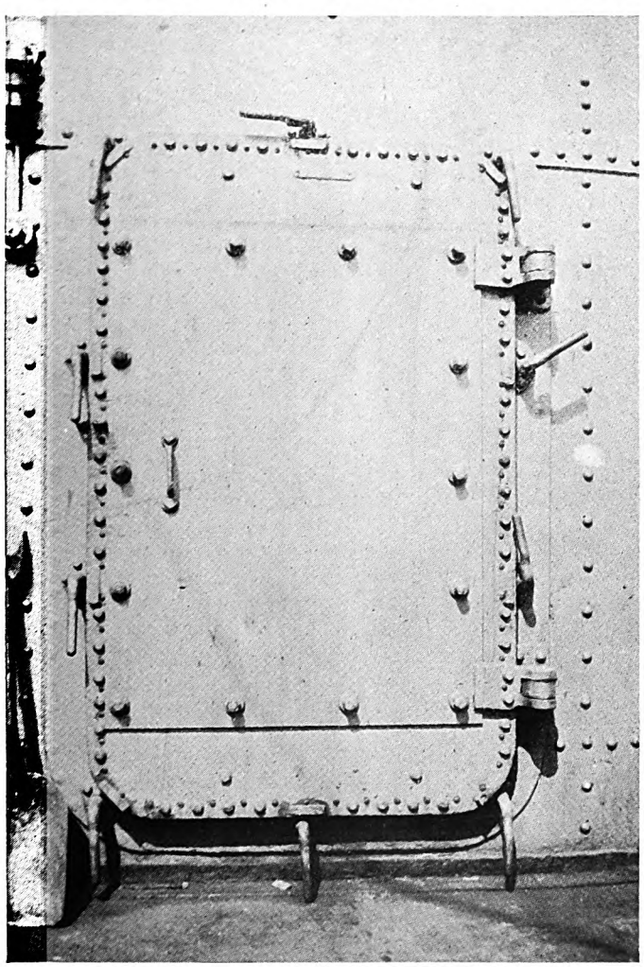

Fig. 2.—Method of Obtaining Exemption and at Same Time Retaining Access by Tonnage Opening in Door

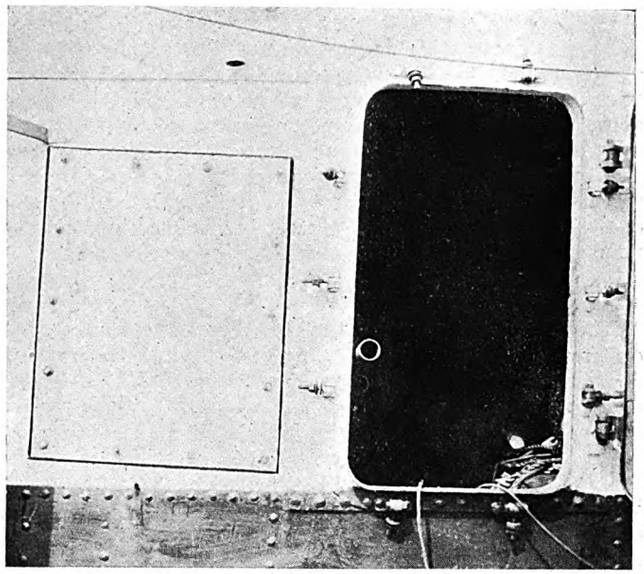

Fig. 3.—Method of Obtaining Exemption and at Same Time Retaining Access by Door at Side of Tonnage Opening

SHELTER DECKS

In the case of shelter deck vessels, the entire cargo space in the shelter deck may be exempted from the gross and net tonnage amounting to from 1,000 to 1,800 tons, according to the size of the vessel, by having what is commonly known as a tonnage hatch installed at a suitable point, either at the forward or after end of the deck. If situated aft, the distance from the after edge of this tonnage hatch and the after side of the stern post must not be less than one-twentieth the registered length of the vessel; if the opening is placed forward, the forward side of hatch must not be less than one-fifth the length of the vessel from the stem.

This tonnage hatch must be not less than 4 feet long and the width must be at least equal to that of the after cargo hatch on the same deck. The coaming in this hatch must not exceed 12 inches mean height above the deck and must be fenced in with guard rails and stanchions, the latter being so fitted as not to lend themselves to battening down the opening. If portable wooden covers are fitted, the lashings, if any, beneath, for holding them down are to be of hemp. All openings in the upper deck are to be provided with the proper means for closing and battening down, but the installation of cleats in this connection disqualifies this entire space from exemption. In addition to this, there must be a freeing port of suitable size (at least 18 inches square or larger) on each side and abreast the deck opening and the bottom of these openings must not be over 12 inches from the deck. A suitable number (at least three on each side) of scuppers, not less than 3½ inches in diameter distributed throughout the shelter deck space must also be fitted.

When this hatch is situated aft, there must be at least two openings in all transverse bulkheads in the 'tween decks forward of the tonnage hatch to entitle the space to exemption. These openings must comply as regards dimensions, and height of coamings, if any, with the requirements as given for the openings to qualify the bridge space for exemption. The openings in the forward bulkhead of the well under the tonnage hatch and in all transverse bulkheads must be closed with the channel bars at the side of the opening fitted with shifting boards as described above. *The steel plates as described for the bridge space will not qualify this space for exemption.*

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Passenger Accommodations

In accordance with the instructions for the measurement of vessels, no part of any vessel will be measured for tonnage that is used for cabins or staterooms constructed entirely above the first deck which is not a deck to the hull. In this case, however, these cabins and staterooms in order to enjoy this exemption must be set aside exclusively for the passengers, as any space occupied by officers or other members of the crew, wherever situated, must be included in the gross tonnage and deducted from the net when so entitled.

Propelling Power Deduction

There are two methods of arriving at this deduction according to the actual size of the engine room and fireroom, and that portion of the space commonly known as "light and air," which is the space above the crown of the engine and fireroom when used for the admitting of light and air to these spaces. When the total engine room and fireroom space is less than 13 percent of the gross tonnage of the vessel, 175 percent (that is the actual space plus 75 percent of the same) is allowed as the propelling power deduction, the 75 percent being allowed for the bunker space. When the total of these spaces exceed 13 percent of the gross tonnage, 32 percent of the gross tonnage is allowed as the propelling power deduction.

In this connection, in cases where actual engine room and fireroom space is less than the 13 percent, but can be made to exceed the 13 percent by adding a portion or all of the light and air space; it is necessary to submit a written request from the owners to the Commissioner of Navigation that this space be so allowed. This request must be accompanied with a description and sketch or tracing, giving the measurements thereof and the certification by the collector of port that such space or spaces are reasonable in size and are for the sole purpose of machinery or for the admittance of light and air to the machinery. When this authority is obtained this space must be added to the gross tonnage in order that same may be allowed as machinery space.

In the case of oil burning vessels having bonafide settling tanks situated outside the confines of the engine room or fireroom, they may also be added to the engine room space by obtaining authority from the Commissioner of Navigation in the same manner as required for light and air.

It will be readily seen that in the case of a vessel whose actual engine room and fireroom amounts to about 11 percent of the gross tonnage of the vessel, it is very beneficial for the owners to make application for sufficient light and air to be added to bring the engine room up to 13 percent, thereby securing the 32 percent deduction and reducing the net tonnage from 300 to 700 tons according to the size of the vessel.

The 32 percent deduction is approximately equivalent to an engine room of from 19 to 20 percent of the gross tonnage of the vessel. For this reason, if the engine room and fireroom combined exceed 20 percent of the gross tonnage and it is requested by the owners, the 175 percent rule which is more advantageous than the 32 percent in this case may be used.

Measurement of Engine Room

In referring to the engine room, it is understood to be that space occupied by the engine room itself and boiler room together with the spaces strictly required for the workings of the engines and boilers, the space below the crown of the engine room. In this connection the crown or top of the main space of the actual engine room from which the depth of same is to be taken will either be at the under side of a deck or if the side bulkheads are curved, at the point or height at which the curve terminates; and the contents of the shaft alley, alleys or trunks in screw vessels including the escape trunk leading from the after part of the shaft alley to the deck, provided that it is not larger than necessary for the purpose of an escape from the shaft alley to the topsides.

The length of the engine room extends from the bulkhead just forward of the fireroom to the one aft of the engines, provided that space is not in excess of that required for the actual operation of the engines and boilers. In case this exceeds the space required, only the space actually required for this operation is allowed. In addition to this, engineer storerooms, tool rooms and dynamo plants, when situated in the engine room and not partitioned off by watertight partitions are included in the engine room space. It is, therefore, advisable to partition these parts off with plates half-way up, the remaining distance being enclosed with heavy wire screening.

Advantage Enjoyed by Oil Burners

Due to a recent decision of the Commissioner of Navigation in which he directed that all double bottoms of the cellular type be exempted from measurement: It has given the oil burning vessel considerable advantage over the coal burning ones, due to the fact that they can carry their fuel in their double bottoms which are not included in the gross tonnage. They also have their settling tanks included as a portion of the engine room, thereby, when necessary, increasing this space just sufficiently to slightly exceed the 13 percent of the gross tonnage, and so obtain an exemption of 19 percent of their cargo space, whereas in reality their bunker space is in their double bottoms which is not included in their tonnage.

The rules of measurement require that all spaces which are deductible must have, permanently cut in a beam and over the doorway of every such space the number of men it is allowed to accommodate or the purpose for which used, the following words: "Certified to accommodate — seamen," "certified messroom," "certified W. C.," etc.

It will be noted from the above that the words gross and net tonnage of a vessel have absolutely no meaning in connection with the size of the vessel, or the amount of cargo she can carry, but are merely a combination of figures which indicate the amount of attention that the owners pay to the exemptions in the law which has been enacted for their benefit.

When the statement was made at the beginning of this article, that an American ship pays more to transit our own American canal than a foreign vessel of the same size, it will be seen that this is due to the fact that the foreign shipbuilders and operators pay particular attention to the different parts of their vessel and that they obtain all exemptions and advantageous deductions, while the American ships do not, due to the fact that these spaces are not fitted in accordance with the rules. The result is that they throw up their hands as a certain very prominent steamship man did, and cried to Congress to change the laws in order to save the American merchant marine, whereas Congress has done everything in its power to help the ships. The only thing to do is for the steamship owners to familiarize themselves with the law and fit their ships accordingly to derive the benefits of existing laws and rulings.

Unfortunately it has been noted how little the American master knows of the tonnage rules in comparison with the masters of foreign vessels.

From the experiences related by various admeasurers in the prosecution of their duties, it would seem that in order to meet all degrees of competition, all parties, owners, masters of vessels and naval architects should familiarize themselves with the canal rules and incorporate the necessary changes in the vessel's hull, not with the purpose of evasion, but with the purpose of taking full advantage of the laws that are designed to benefit our merchant marine by wise exemptions. The foregoing paragraphs indicate in a measure how this can be done and it is hoped that some steamship companies will benefit by it accordingly.

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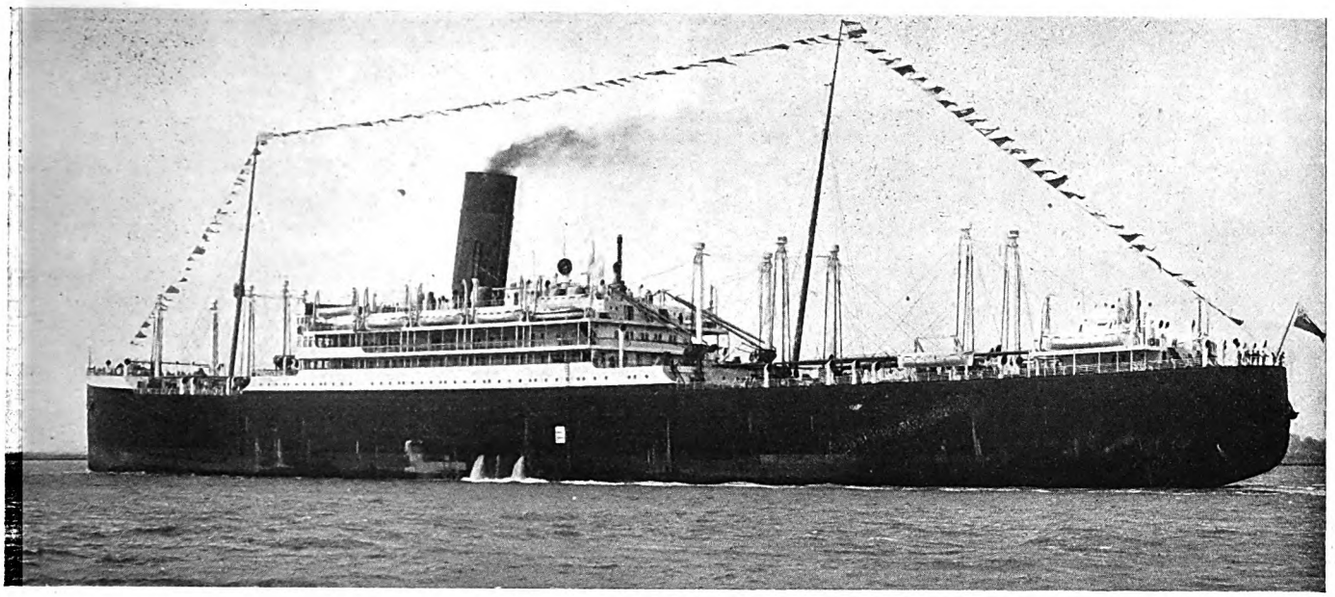

S. S. Minnewaska—the First of the New Atlantic Transport "Minne" Boats

New Atlantic Transport Passenger Liner Minnewaska

First of the New "Minne" Steamers Renews Direct Passenger Service Between New York and London

THE new Atlantic Transport liner *Minnewaska,* which recently completed her maiden voyage from London to New York, is a fine example of post-war shipbuilding. Designed and constructed at the yard of Harlan & Wolff, Ltd., at Belfast,, Ireland, she is the largest vessel launched at that famous shipbuilding center since the war and is the largest vessel plying to the port of London. She will be followed early next year by a sister ship, the *Minnetonka.*

Original "Minne" Ships

Since losing its four original "Minne" boats in the war—all were sent down by mines or torpedoes while serving as transports—the Atlantic Transport Line has maintained a large and regular service for freight between American and British ports. The original "Minne" ships were vessels of about 14,000 tons register. The new ships are some 7,000 tons larger than the old and as a matter of course more elaborately fitted.

Carries First-Class Passengers Only

Great care was exercised in designing and building a ship that should meet every established requirement of the Atlantic Transport Line—large cargo capacity combined with high-class accommodation for first-cabin passengers only being chief essentials.

Following traditional practice, proven sound in the earlier ships of the "Minne" class, generous breadth was decided on, to give steadiness at sea. The design called for a big-bodied ship, therefore, having nothing of the express type about her, yet capable of good speed.

Great Beam Insures Steadiness

In order to secure great steadiness at sea, the new liner has been given a greater breadth in proportion to her length than any other liner—80.37 feet to an overall length of 626 feet. Having a cargo capacity of 17,000 tons, and being fitted with bilge keels, the *Minnewaska* with her generous beam is one of the steadiest ships afloat.

Another outstanding feature of the new ship is the amount of space available to each passenger, which exceeds that on any other ship, owing to the fact that the passenger list is restricted to 369 persons, while the cubic contents of passenger accommodation, and the area of the ship's decks, are on a scale that would afford generous space to a much greater number.

The following are the main particulars of the vessel:

Length overall	626	feet
Length between perpendiculars	600.8	feet
Beam, molded	80.37	feet
Depth	49.4	feet
Gross Tonnage	21,400	
Deadweight tonnage	17,000	
Horsepower	15,000	
Designed speed	17	knots
Trial speed	17.8	knots
Number of first class passengers	369	

Passenger Accommodations

All passenger quarters are amidship, and above the upper deck D. There are four decks devoted exclusively to passenger accommodations.

One deck, A, is given over entirely to public rooms which are of generous size and reflect an atmosphere of dignity. Fine natural wood panelings and white walls are the keynote of the principal decorations. The lounge is finished in American sycamore, in seventeenth century style; the reading-room in white; the smoking-room in paneled cedar; entrance halls in oak; the dining saloon—seating 322 persons at small tables—and the adjoining reception room in white and oak. In the reception room is a concert organ, a grand piano and a parquetry floor for dancing.

Staterooms are designed to give large space to each passenger. Each principal stateroom has a bedstead, and some two, of either mahogany or oak.

B deck is occupied principally by suites and the larger staterooms. There are two suites here consisting of sitting-room, bedroom and bath, and ten semi-suites, consisting of

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Promenade Deck

Reading Room

bedroom with bath, besides various connecting bedrooms. There are thirty-nine baths altogether, and all bedrooms have running hot and cold fresh water, steam heat, and direct and indirect ventilation. All B deck rooms have rectangular windows, as in a house.

The service section of the ship is designed to embody many modern features, including a complete electrical bakery, and electric kitchen equipment.

Propelling Machinery

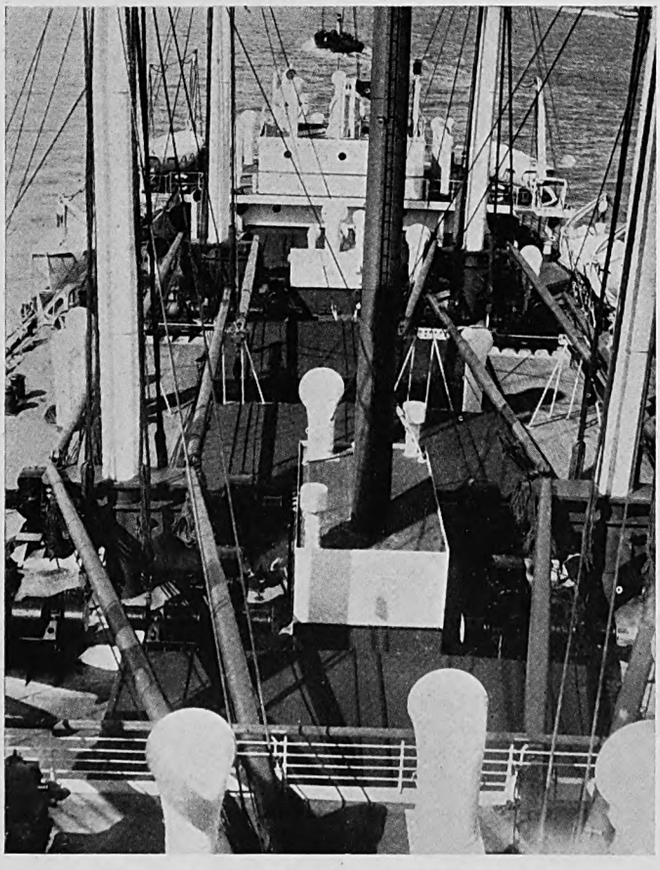
Propulsion is by a two-shaft arrangement of Brown-Curtis single reduction geared turbines with an astern turbine incorporated in the exhaust casing of each low-pressure turbine.

Steam is generated at 215 pounds per square inch and with a superheat of 100 degrees F. in 12 watertube boilers, which are arranged for oil burning under the White low pressure system, working under assisted natural draft.

Auxiliaries Electrically Driven

The electrical installation is very extensive. All winches are electrically driven as are nearly all the engine room auxiliaries. There are four 400 kilowatt direct current generators, each coupled direct to a steam turbine. The dynamos run in parallel and are each capable of giving an output of 1,818 amperes at 220 volts. In addition there is one 75 kilowatt dynamo direct coupled to a Burmeister & Wain Diesel oil engine, situated at the stern for supplying current if for any reason the main dynamos are out of action.

The electrically driven engine room auxiliaries include the main circulating pumps, of which there are four, each of 120 brake horsepower, sanitary pump, forced lubricating pumps, air and circulating pumps for the auxiliary condenser, forced draft fans and bilge pumps. In all, 20 electrically driven ventilating fans are fitted.



Deck View Aft, Showing Cargo Handling Appliances

Lounge

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Oil-Fired Scotch Boiler Gives 85 Percent Efficiency*

By C. J. Jefferson**

Tests by United States Shipping Board and Bureau of Mines show that combined efficiencies of Scotch boiler, superheater and air heater of 85 percent can be obtained with oil-firing and forced draft, 83 percent with oil-firing and induced draft and 78 percent with hand-firing, coal-burning and forced draft.

THE following brief account of the tests run on a Scotch marine boiler by the United States Shipping Board in conjunction with the Bureau of Mines has been written with the idea of presenting to the marine world a few facts and figures in regard to the possible efficiencies and capacities that may be obtained with the Scotch marine boiler, provided it is operated with the same care in supervision as that given to the average efficient stationary plant.

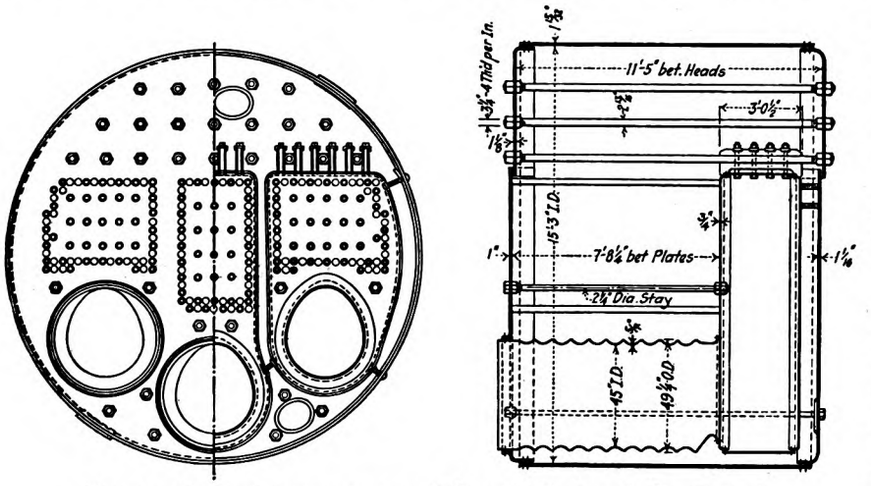

Fig. 1.—General Arrangement of Scotch Marine Boiler Tested

From the analysis of the logs of approximately 250 vessels, it is apparent that the average merchant marine cargo carrier develops approximately 60 to 65 percent efficiency in her boiler plant when oil-fired and that these values are from 55 to 60 percent for coal-fired boilers. This same condition holds true for the average stationary plant of less than 1,000 boiler horsepower, as has been shown by several analyses made at various times of boiler tests conducted on this type of plant.

The time has come, however, when better results must be obtained. The Diesel engine is rapidly entering the marine field and the steam-driven vessel must develop its maximum efficiency, if it hopes to be able to sail in competition with the motorship, even after making all allowances for the relative difference in the first cost for installation.

Moreover, the merchant marine of the United States has established a higher standard of living for its operating personnel than its competitors. This higher standard means increased cost of operation, which, in turn, must be met by increased efficiency of performance.

The first essential in obtaining higher efficiencies is to educate the operating personnel to the point where they appreciate what higher efficiencies mean, how to use the instruments necessary for determining the efficiency of combustion, and how to correct faulty combustion and thereby build up boiler efficiency.

For this purpose the United States Navy has now opened a school at the Philadelphia Navy Yard for the benefit of the United States merchant marine, where a short and intensive course is given in the theory and practice of fuel-oil burning. Candidates for this school must be American citizens holding merchant marine licenses with the grade of second assistant or higher.

The tests which are outlined below were conducted by the United States Shipping Board in order that reliable and accurate data might be obtained as to the possible efficiency and capacity of the Scotch marine boiler, which is one of the oldest types of boilers in service and which has been accepted as a good, reliable servant without due regard being paid to its possible efficiency.

The Bureau of Mines was especially interested in making the thermodynamic survey of the boiler by means of thermocouple readings, gas analyses, etc., to determine the effects of combustion by the water-cooled furnace.

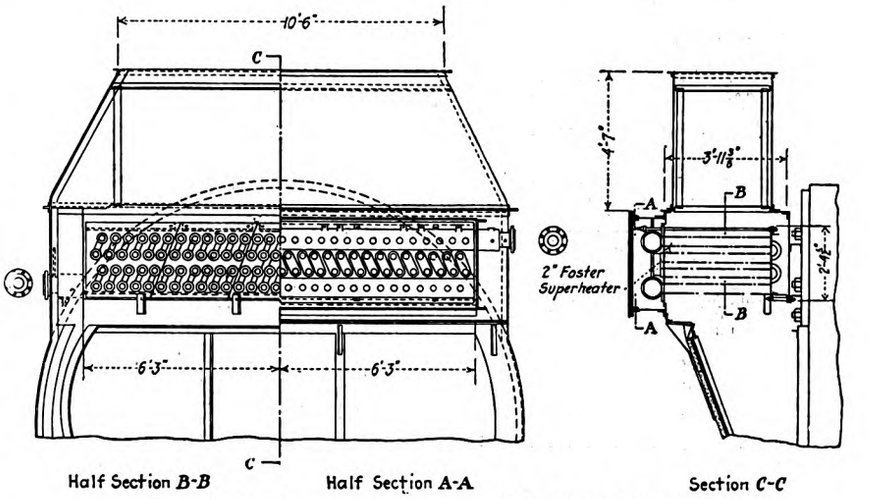

Fig. 2.—Superheater Used with Scotch Marine Boiler Tested

Its findings are now being prepared by Mr. Mumford of the Bureau of Mines and his associates who worked with him and the author in carrying out these tests.

The boiler selected for the test purposes was a single-ended, three-furnace, separate-combustion-chamber type, hav-

*Abstract of paper read before Metropolitan Section of the American Society of Mechanical Engineers, New York, November 14, 1922.

**Head of Fuel Conservation Section, United States Shipping Board.

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ing 2,777 square feet of heating surface with coal fire and 3,022 square feet with oil fire. The boiler was fitted with a Foster waste-heat superheater having 774 square feet of heating surface and which was placed within the gas pass above the smokebox. Above this superheater was an air heater having 1,220 square feet of heating surface which heated the air supply to the Howden fronts when running forced draft. Fig. 1 shows the general arrangement of the boiler and Fig. 2 that of the superheater.

The Tests

Tests were divided into four distinct groups, namely, hand-fired coal, pulverized coal, forced-draft oil fire, and induced-draft oil fire. The pulverized-coal experiments were conducted to the point where it was demonstrated that this type of firing is not feasible for marine service of the Scotch boiler, as the limited size and water-cooled feature of the furnaces and combustion chambers prevented operating at ratings which were sufficiently high to meet the demand made by the average marine boiler plant.

Fig. 3 shows the boiler fitted for the hand-fired coal-burning test. In this figure the smokebox, ashpit, and fire doors are shown wide open as it was taken immediately after thorough cleaning of the fire side of the boiler in preparation for the test. Four of the coal-burning tests which show typical results are given in Table 1. These tests are selected as representing results covering a combustion range from 13.07 pounds to 30.9 pounds of coal per hour per square foot of grate surface. It will be noted that the plant efficiency including boiler, superheater, and air heater ranges from 73.9 to 77.9 percent. All of these tests were run under forced-draft operating conditions.

The forced-draft oil-burning tests were conducted using Dahl, Schutte & Koerting, Coen, Todd, and Bethlehem Shipbuilding Corporation burners, all of these except the last named being used in conjunction with the Howden combined oil- and coal-burning front.

Forced-Draft Runs

Fig. 4 shows the boiler fitted with burners installed in the Howden front for forced-draft runs. Table 2 gives the results for three representative tests of this series covering a range of from 0.276 to 0.666 pound of oil per hour per square foot of heating surface. It will be noted that the combined boiler, superheater and air heater efficiency ranges from 83.5 to 84.6 percent. Fig. 7 gives the average efficiency values covering the entire series of forced-draft oil-burning tests.

TABLE 1.—HAND-FIRED COAL TESTS OF SCOTCH MARINE BOILER

Boiler: 3-furnace, with separate combustion chambers; heating surface, 2,777 square feet; grate surface, 61.8 square feet; area through tubes, 11.94 square feet; combustion chamber volume, 289.4 cubic feet; heating surface of air heater, 1,220 square feet; superheater heating surface, 774 square feet; retarders in tubes; bridge wall, C.I.V.; Coal used, Georges Creek run of mine.

Test number	1-1-1-10	1-1-1-9	1-1-1-8	1-1-1-11
Duration, hours	12.0	10.0	8.083	6.089
Total fuel fired, pounds	9,696	12,000	12,521	11,619
Fuel as fired, pounds per square foot of grate surface per hour	13.07	19.4	25.1	30.9
Proximate analysis of fuel:				
Moisture percent	2.15	2.27	1.97	2.17
Fixed carbon, percent	70.93	69.87	70.00	69.44
Volatile, percent	18.84	19.07	19.52	19.14
Ash, percent	8.08	8.79	8.51	9.25
Heating value, B.t.u. per pound	13,329	13,779	13,858	13,683
Ultimate analysis of fuel:				
Hydrogen, percent	4.61	4.58	4.58	4.56
Carbon, percent	80.08	79.34	79.73	79.01
Nitrogen, percent	1.91	1.81	1.91	1.89
Oxygen, percent	4.43	4.52	4.27	4.42
Sulphur, percent	0.89	0.88	0.95	0.87
Ash and refuse:				
Total weight, pounds	1,200	1,340	1,309	1,125
Percent referred to dry coal	12.66	11.40	10.60	9.90
Heating value, B.t.u. per pound	3,110	4,540	4,120	4,938
Flue-gas analysis:				
CO_2, percent	11.2	12.2	12.3	11.8
O_2, percent	6.8	6.6	6.4	7.3
CO, percent	0.07	0.2	0.3	0.02
N_2, percent	81.88	81.0	81.0	80.88
Boiler pressure, gage, pounds per square inch	163	157	166	158
Superheat, degrees	1	14	23	38
Moisture in steam leaving boiler, percent	0.58	0.50	0.55	0.57
Drafts and air pressures (inches of water):				
Below grates	+ 0.19	+ 0.54	+ 0.605	+ 0.900
Furnace	+ 0.02	+ 0.16	+ 0.283	+ 0.380
Below air heater	— 0.08	— 0.058	— 0.065	— 0.090
Base of stack	— 0.12	— 0.122	— 0.092	— 0.130
Gas temperatures (degrees F.):				
Leaving boiler	437	503	537	606
Leaving superheater	372	447	472	519
Leaving air heater	277	336	361	396
Total water fed to boiler, pounds	100,560	124,670	122,328	116,988
Feedwater temperature, degrees F.	212	204	193	208
Equivalent evaporated steam from boiler, pounds per hour per square foot of heating surface	3.14	4.71	5.78	7.4
Actual evaporation per pound of coal fired	10.37	10.40	9.76	10.07
Efficiency of boiler without superheater, percent	75.2	76.7	72.6	74.6
Heat balance:				
Heat absorbed by boiler, percent	75.8	77.9	73.9	76.8
Loss due to moisture in fuel, percent	0.2	0.2	0.2	0.2
Loss due to burning hydrogen in fuel, percent	3.4	3.5	3.5	3.6
Loss due to heat carried away in dry gas, percent	6.2	7.1	7.4	9.3
Loss due to CO, percent	0.4	0.9	1.3	0.1
Loss in combustion—ash and refuse, percent	2.5	3.3	2.8	3.1
Loss unaccounted for, percent	11.5	7.1	10.9	6.9
Heat in fuel as fired, percent	100	100	100	100

TABLE 2.—FUEL-OIL TESTS OF SCOTCH MARINE BOILER—HOWDEN FRONT FORCED DRAFT

Boiler: 3-furnace, with seperate combustion chambers; heating surface, 3,022.4 square feet; heating surface of air heater, 1,220 square feet; superheater heating surface, 774 square feet; retarders in tubes.

Test number	26	36	43
Duration, hours	8.03	2.888	3.026
Combustion space, cubic feet	561	545	588
Total fuel fired, pounds	6,704	3,794	6,091
Fuel per burner per hour, pounds	278	438	671
Fuel per hour per square foot of heating surface, pound	0.276	0.435	0,666
Analysis of oil as fired:			
Moisture, percent	0.9	0.3	0.3
Sediment, percent	trace	trace	trace
Hydrogen, percent	11.9	11.72	11.6
Carbon, percent	83.3	83.83	84.5
Sulphur, percent	3.9	4.15	3.6
Gravity, degrees B.	15.4	15.4	15.4
Specific gravity	0.963	0.963	0.963
Flash point, degrees F.	166	166	166
Burning point, degrees F.	234	234	234
Heating value, B.t.u. per pound	18,193	18,324	18,234
Flue-gas analysis:			
CO_2, percent	10.8	12.3	12.6
O_2, percent	6.3	4.5	3.7
CO, percent	0.03	0	0
N_2, percent	82.87	83.2	83.7
Weight of gas per pound of fuel, pounds	19.37	16.9	16.83
Boiler pressure, gage, pounds per square inch	170	172	178
Superheat, degrees	24	32	45
Moisture in steam leaving boiler, percent	0.65	0.62	0.62
Drafts and air pressures (inches of water):			
Furnace	+ 0.29	+ 0.19	+ 1.28
Below superheater	— 0.08	— 0.09	— 0.05
Below air heater	— 0.11	— 0.11	— 0.09
Base of stack	— 0.14	— 0.14	— 0.11
Gas temperatures (degrees F.)			
Leaving boiler	533	597	665
Leaving superheater	470	512	571
Leaving air heater	341	385	428
Total water fed to boiler, pounds	97,635	56,574	88,130
Feedwater temperature, degrees F.	188	218	206
Equivalent evaporated steam from boiler, pounds per hour per square foot of heating surface	4.29	6.72	10.10
Actual evaporation, pounds per pound of oil fired	14.57	14.91	14.47
Efficiency of boiler without superheater, percent	82.80	81.80	80.73
Heat balance:			
Heat absorbed by boiler and superheater, percent	84.6	83.8	83.5
Loss due to moisture in fuel, per cent	0	0	0
Loss due to burning hydrogen in fuel, percent	6.0	5.6	6.0
Loss due to heat carried away in dry gas, percent	3.8	3.9	4.4
Loss due to CO, percent	0.2	0	0
Loss in unconsumed oil and unaccounted for, percent	5.4	6.7	6.1
Heat in fuel as fired, percent	100	100	100

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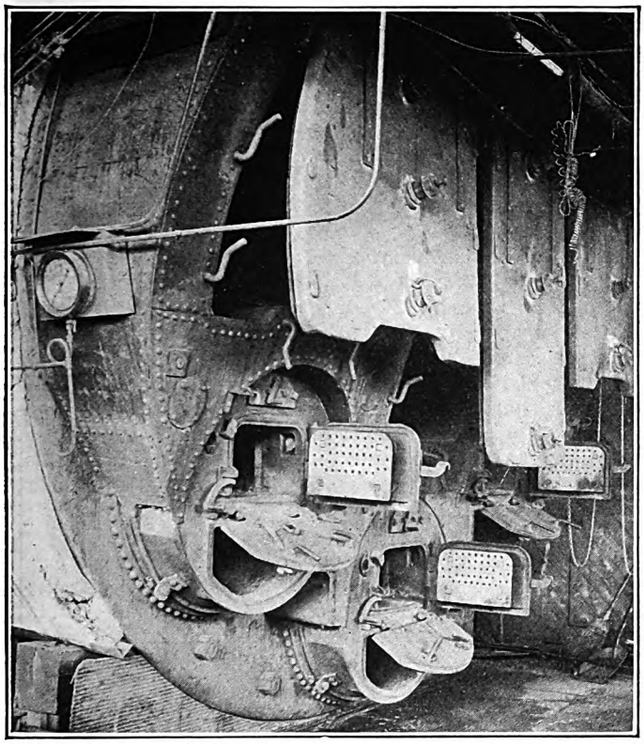

Fig. 3.—Scotch Marine Boiler as Fitted for Hand-Fired Coal-Burning Test

The induced-draft tests were conducted with the Bethlehem Shipbuilding Corporation burner shown in Fig. 5, as well as with the Schutte & Koerting types "L" (modified) and "N," the Coen, the Todd, and the Enco burners. This latter burner, Fig. 6, was originated at the Philadelphia Navy Yard Fuel Oil Test Plant, and its adaptation for use in Scotch boiler service was developed during these tests.

INDUCED-DRAFT TESTS

The ratings obtained in these induced-draft tests were limited by the amount of available draft as the height of stack above the center of furnace was only 40 feet and this draft was augmented by a ½-inch steam nozzle. The combined effect of the stack and nozzle produced an 0.9-inch draft at the base of the stack. Table 3 gives the data of four representative tests covering a range of from 0.233 to 0.513 pound of oil per hour per square foot of heating surface and showing efficiencies ranging from 80.6 to 82.9 percent. Fig. 8 gives the average efficiency values obtained from all of the tests of this class.

TABLE 3.—FUEL-OIL TESTS OF SCOTCH MARINE BOILER—NATURAL DRAFT REGISTERS

(Boiler same as used in tests of Table 2)

Test number	97	94	67	79
Duration, hours	3.00	2.498	3.203	2.981
Combustion space, cubic feet	560	560	561	564
Total fuel fired, pounds	2,111	2,868	4,408	4,625
Fuel per burner per hour, pounds	235	383	459	517
Fuel per hour per square foot of heating surface, pound	0.233	0.380	0.455	0.513
Analysis of oil as fired:				
Moisture, percent	0	0.1	0.1	0
Sediment, percent	trace	trace	trace	trace
Hydrogen, percent	11.37	11.25	11.34	11.78
Carbon, percent	84.08	83.82	83.60	83.98
Sulphur, percent	4.0	3.9	3.5	3.8
Gravity, degrees B	15.4	15.4	15.4	15.4
Specify gravity	0.963	0.963	0.963	0.963
Flash point, degrees F	166	166	166	166
Burning point, degrees F	254	254	254	254
Heating value, B.t.u. per pound	18,382	18,418	18,248	18,459
Flue-gas analysis:				
CO_2, percent	12.8	13.06	12.2	11.98
O_2, percent	3.3	3.0	4.4	4.4
CO, percent	0.03	0.17	0.01	0.06
N_2, percent	84.87	83.77	83.39	83.56
Weight of gas per pound of fuel, pounds	16.48	15.95	17.19	17.49
Boiler pressure, gage, pounds per square inch	172	174	172	168
Superheat, degrees	0	14	28	33
Moisture in steam leaving boiler percent	0.62	0.64	0.62	0.47
Drafts and air pressures (inches of water):				
Furnace	—0.14	—0.22	—0.31	—0.64
Below superheater	—0.15	—0.25	—0.48	—0.78
Base of stack	—0.15	—0.31	—0.57	—0.84
Gas temperatures (degrees F.):				
Leaving boiler	448	525	589	548
Leaving superheater	420	473	503	490
Total water fed to boiler, pounds	32,276	41,282	61,813	66,348
Feedwater temperature, degrees F.	232	212	191	212
Equivalent evaporated steam from boiler, pounds per hour per square foot of heating service	3.63	5.69	6.79	7.68
Actual evaporation, pounds per pound of oil fired	15.29	14.39	14.02	14.35
Efficiency of boiler without superheater, percent	82.35	78.98	79.29	78.70
Smoke, Ringlemann scale	1.5	1.75	1.5	2.5
Heat balance:				
Heat absorbed by boiler and superheater, percent	82.9	80.2	81.1	80.6
Loss due to moisture in fuel, percent	0	0	0	0
Loss due to burning hydrogen in fuel, percent	5.7	5.7	6.0	6.1
Loss due to heat carried away in dry gas, percent	7.1	8.4	9.6	9.4
Loss due to CO, percent	0.1	0.6	0	0.2
Loss in unconsumed oil and unaccounted for, percent	4.2	5.1	3.3	3.7
Heat in fuel as fired, percent	100	100	100	100

SUMMARY

In comparing Figs. 7 and 8, the fact must be kept in mind

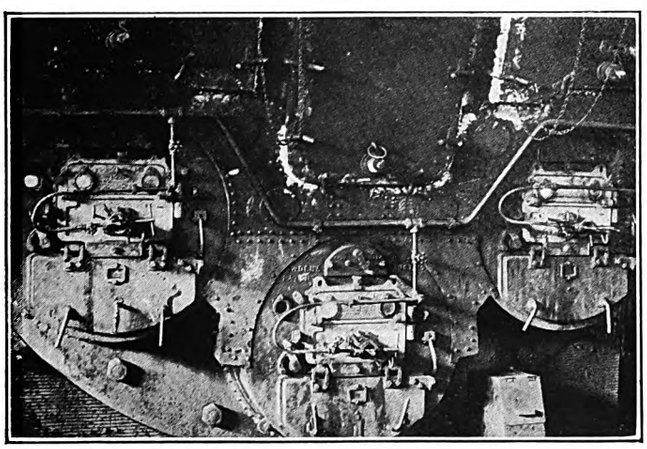

Fig. 4.—Scotch Marine Boiler as Fitted with Burners Installed in Howden Front for Forced-Draft Runs

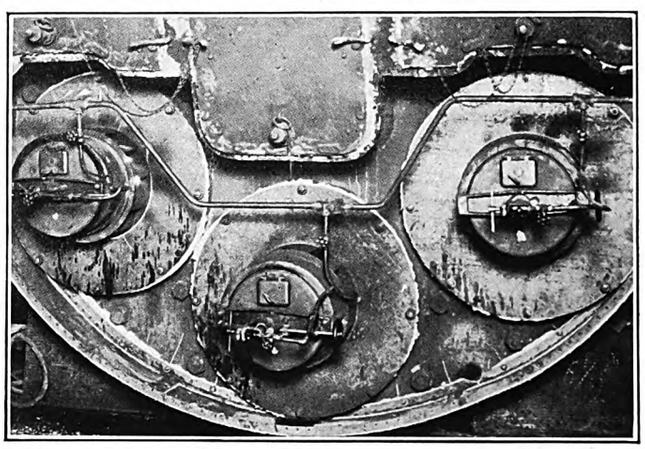

Fig. 5.—Scotch Marine Boiler as Fitted with Bethlehem Burners for Induced-Draft Tests

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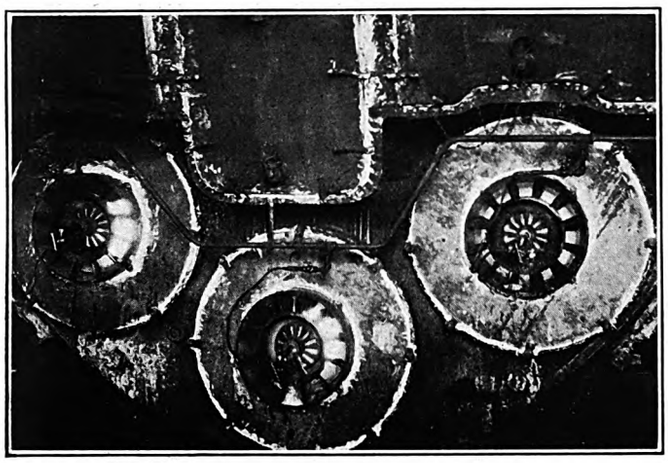


Fig. 6.—Scotch Marine Boiler as Fitted with Enco Burners for Induced-Draft Tests

that the induced-draft tests did not have the help of the air heater in building up furnace efficiency.

From the foregoing data it will be seen that the Scotch marine boiler is capable of efficiencies considerably in excess of the average operating values obtained, and it is, therefore, a matter of simple calculation to show what considerable fuel savings are possible when reasonable supervision is shown on the part of the operating force.

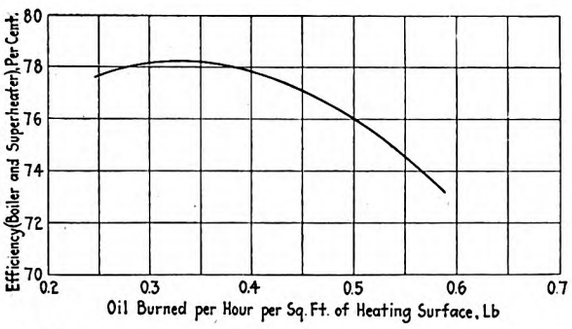


Fig. 7.—Average Combined Efficiency Values Obtained in the Forced-Draft Oil-Burning Tests

(1,002.46 × pounds oil per square foot of heating surface = oil per burner.)

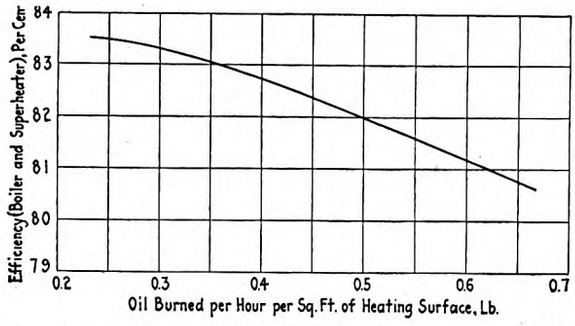


Fig. 8.—Average Combined Efficiency Values Obtained in the Induced-Draft Tests

(1,002.46 × pounds oil per square foot of heating surface = oil per burner.)

[Editor's Note.—Photographs of all the burners used in the tests were submitted to the American Society of Mechanical Engineers with the original paper. The selection of illustrations was made by the editor of *Mechanical Engineering*, in which the paper was first published and from which the above abstract is reprinted.]

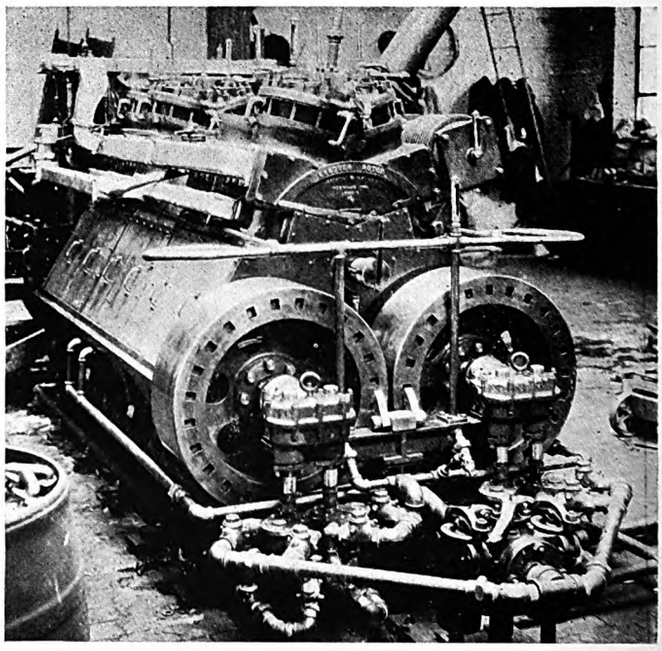
Improved Scavenging Two Cycle Oil Engine

TWO cycle Diesel engines, ranging upwards from 50 horsepower to any power required, or from 4-inch cylinder bore, have been developed by the Knudsen Motor Corporation, 30 Church street, New York, claiming as their greatest feature practically 100 percent scavenging efficiency. The Knudsen engine is designed for either electric or direct drive and has an extremely light weight per horsepower.

It is claimed that the high fuel economy and mechanical efficiency are obtained by the elimination of all but four mechanical motions. The fuel pump is operated by a cam and the fuel valve is automatically actuated by the impulse of the fuel pump. The crank shaft is operated by the connecting rod which in turn is moved by the piston. Air in the cylinder when expanding gives an impulse to the piston. A long period of expansion is obtained, due to the short exhaust ports which are 10 percent of the stroke. From this it will be understood that all exhaust and scavenging valves and complicated casings have been eliminated. The thorough scavenging effect combined with the design of the cylinders produces the necessary mixing of the pure air charge within the cylinders and accomplishes complete combustion.

Piston Controlled Ports

The pistons are arranged so that the one controlling the exhaust ports uncovers them before the scavenging ports there-



Knudsen Engine Erected for Shop Tests

by allowing the exhaust gases to escape to the atmosphere and lowering the pressure to atmospheric thus precluding the possibility of the exhaust gases blowing back into the scavenging system. The pistons working up and down at the same time control the period of the exhaust as well as the scavenging period. The early opening of the exhaust ports is accomplished by advancing the right side piston a certain number of degrees ahead of the left side piston which controls the opening and closing of the scavenging ports. The earlier opening of the exhaust ports results in their earlier closing, thus permitting the cylinders to become charged with pure scavenging air at scavenging pressure after thorough scavenging takes place and before compression commences. This results in what is termed super-charging, the ad-

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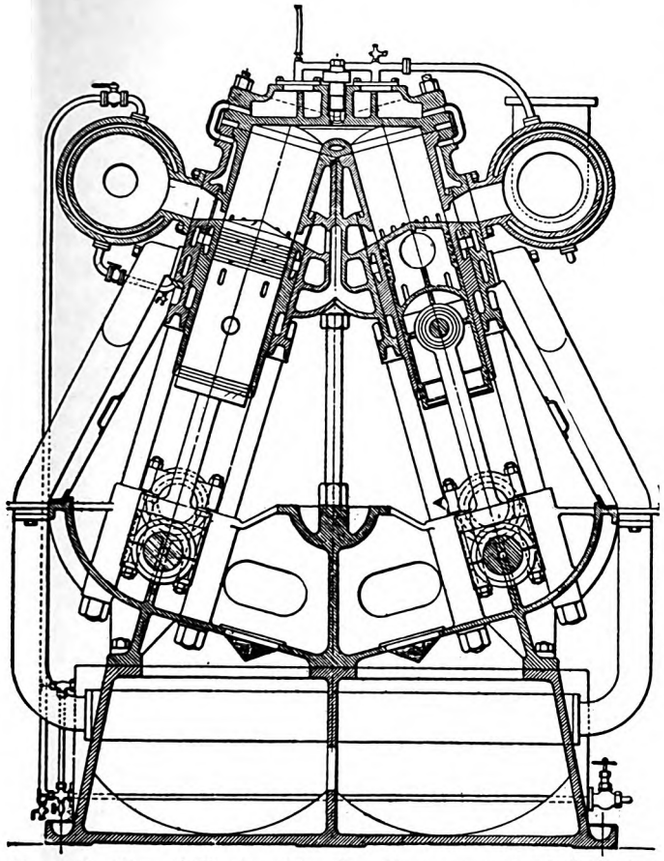


Cross Section of Engine Showing Arrangement of Cylinders and Ports

vantage being that greater expansion takes place while consuming the same amount of fuel, with the result that higher economy and more complete fuel combustion are obtained. Super-charging varies with different speeds and powers—varying from 10 to 30 percent for the greater speeds and higher powers.

METHOD OF SCAVENGING

Thorough scavenging is secured in the Knudsen motor by introducing two-thirds of the volume of scavenging air into the cylinders through ports circumferentially arranged upon the cylinder walls. One-third of the air is passed through the piston heads to act as a cooling agent for the pistons. This air absorbs a certain quantity of heat in moving through the pistons which increases its volume as well as its velocity, after which it finally passes into the cylinder through the circumferential ports to assist the larger amount of air blowing through the scavenging ports and to complete the expulsion of burnt gases.

The scavenging pump which supplies the air at 2 to 3 pounds gage pressure for scavenging the working cylinders is so designed that a ratio of 1½ to 1 exists between its cylinder volume and that of the working cylinders, thus insuring a sufficient quantity of air even at low speeds to perform its function.

AIR-COOLED PISTON

The pistons are cooled as noted above by passing a third of the volume of scavenging air through them, thus eliminating the usual method of piston cooling by means of water or oil carried to the pistons by telescopic pipes. Water especially in most engines is a constant source of trouble since there is always danger of its entering the lubricating oil systems; the greatest care must be maintained on the part of the operators to prevent this leakage.

Crank shafts are made to pass the highest requirements and are both statically and dynamically balanced in order to reduce vibration. With the exception of the spray valves, there are no valves necessary for the intake of air or the exhaust of burnt gases so that cam shafts, valves and their openings and closing gear and springs are eliminated.

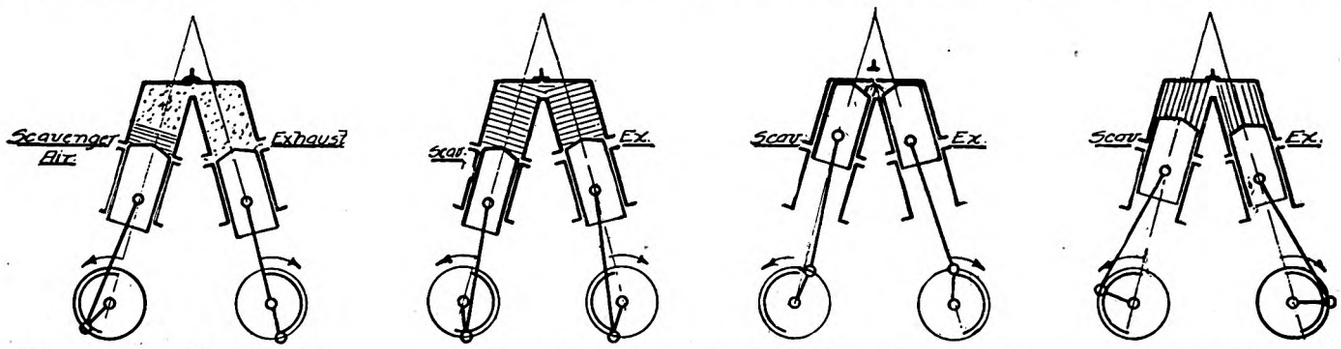
Fuel is injected to the cylinders through the spray valves by a multiple plunger pump cam-actuated. The amount of fuel supply to each cylinder is controlled by this pump under a pressure of 100 pounds. The pump also acts as a measuring device to regulate the amount of fuel for each cylinder. The pump control is arranged so that the injection of fuel can be retarded or advanced while the engine is in service.

TYPES OF DRIVE

The engine can be geared down to the most economical propeller speed by means of a quill type floating pinion and gear. The pinions are made of the finest chrome nickel steel, a material which has proved to be excellent for marine service. The pinion acts in such a way that the teeth of the gear are covered by the necessary film of oil when working which prevents direct metallic contact between the teeth of the pinion and gear thus insuring long life.

Westinghouse Company Develops Automatic Sectional Type Electric Bake Ovens for Marine Use

A NEW type of electric bake oven that, because of its economy, flexibility, and compactness and the high quality of its product is particularly well adapted for marine service has recently been developed by the Westinghouse Electric & Manufacturing Company. This new oven, which is known as the automatic sectional-type electric bake oven, is constructed in sections, each of which is independent of other sections and is entirely automatic in its operation.



Exhaust piston full open, when scavenger commences to open. Supercharging. Compression fuel valve open for injection. Working stroke.

Diagram of Scavenging and Supercharging of Knudsen Motor

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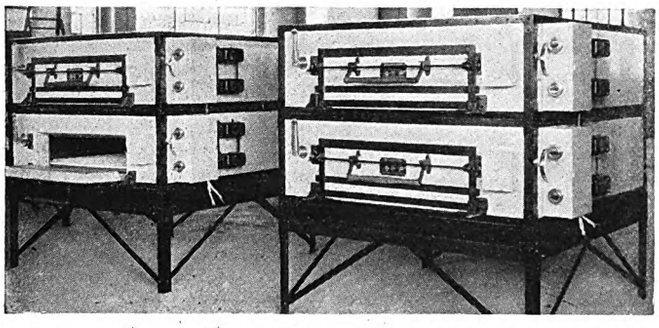
The sections are made in two standard sizes, one with a capacity of 20 and the other of 60 loaves.

Each section is equipped with motor operated snap switches, a thermometer and a thermostat for controlling the oven temperature. The heating units, which are entirely enclosed, are mounted at the top and bottom of each section and are distributed so as to give a uniform temperature throughout the baking chamber.

The temperature of these ovens is controlled by an arm projecting through the metal control box at one end of each section. By moving this arm along a graduated scale, oven temperatures ranging from 300 to 500 degrees F. can be obtained. When the temperature in the oven section gets



Battery of Westinghouse Sectional Type Bake Ovens, Each of Which Consists of Two 60-Loaf Sections

too high, the thermostat, operating through the motor operated snap switch shuts off the current automatically and turns it on again when the temperature has dropped. It is thus possible, it is claimed to keep the temperature within ten degrees of the operating temperature without any attention whatever.

Because of the independence of the sections and the efficiency of the insulation between them, different temperatures can be maintained in each section and a number of products, limited only by the number of sections in the installation, can be baked at one time. A new section can be added to the installation at any time, if the need arises.

United States Battleship Colorado

(*Continued from page* 608)

are of sufficient capacity to open the circuits under full power and full voltage, although in normal operation, the circuit breakers are never opened or closed under load. The levers for manual operation of the circuit breakers are located directly in front of the control room instrument board, and are connected to the circuit breaker operating mechanisms through a system of bell cranks and rods. The arrangement of the operating levers is such that the operator faces forward. The operating levers are interlocked to prevent improper operation. The primary circuit breakers are located in the control room and are arranged in two rows athwartship with an aisle between them for inspection and repair. The secondary short circuiting breakers are located in the motor rooms and are operated from the control room. The liquid rheostats for controlling the motor secondaries are located in the control room. In order to disconnect circuits completely, self-contained disconnecting devices have been provided on the reverser and generator circuit breakers. The mechanism is so arranged that the circuit breaker must be opened before it is possible to disengage the disconnecting device. This provision safeguards the men in case of improper or faulty operation, and at the same time makes it possible to inspect or repair a circuit breaker while the ship is under way.

The levers operate the circuit breakers and rheostat valves in pairs, and are arranged in a single row, directly aft of the circuit breaker structure. The arrangement is symmetrical so that levers on the left of the central position operate the circuit breakers in the after generator and port motor circuits; while those on the right of the central position operate the circuit breakers which control the circuits of the forward generator and starboard motors. All the levers are mechanically interlocked so as to insure the proper sequence of operation. The scheme of interlocking is such that the field must be off and the steam control reduced to a low setting before any of the above circuit breakers can be operated.

With two generators in operation, the control of the port and of the starboard side of the ship are independent. With the tie circuit breaker closed, and one generator in operation, the direction of rotation of port and starboard screws may be in the same or opposite directions, but of necessity must be at equal speeds.

All starting and maneuvering is done with the 24 pole connection. When the motors are thus connected, the secondaries are controlled during starting and reversing by means of liquid rheostats. There is one double rheostat for the port motors and one for the starboard motors. The rheostat consists essentially of a two-compartment tank, the lower compartment of which serves as a reservoir for the electrolyte, and also as a container for the cooling coils, while the upper compartment contains the electrodes. When it is desired to use a rheostat, the valve in the upper compartment is closed by means of a lever operated from the control stand, thus allowing the liquid to rise in the upper compartment. After the maximum level has been reached, the motor secondary is completely short-circuited by means of an oil circuit breaker which is operated by a lever from the control stand.

The generator field excitation is adjusted by means of a field lever in the control room, which controls the generator field of a motor generator booster set. The booster generator is connected in series with the generator field and functions to either boost or buck the 240 volts supplied by the auxiliary generator which furnishes excitation and auxiliary power. With this arrangement, the required value of generator field excitation is obtained most economically.

The protection for the propelling machinery is provided by a ground detector system, which automatically indicates a ground and also the circuit in which the ground exists, and by unbalanced phase relays which are arranged to trip out the generator field switch in case of any appreciable unbalance in the loadings of the different phases, which might be caused by grounds, short circuits, or otherwise.

SAN FRANCISCO PORT RECORDS BROKEN DURING JULY.—With a total of 1,198 vessels passing through the port of San Francisco during July, all records were broken. There was more activity along the San Francisco water front during that period than for any similar period in the history of the port. Of the total number of vessels passing through the port 616 were arrivals and 582 departed. The 616 arriving ships represented 1,432,819 tons while the 582 departing vessels represented 1,306,416 tons, or a grand total cargo of 2,739,235 tons. The enormity of the gains in commerce, with its resultant prosperity, is vividly shown by a comparison with the figures of July, 1922. In that month the arriving ships numbered 499, showing an increase in favor of July this year of 117 ships. The departing ships in July, 1922, numbered 478, a gain of 104. In tonnage, the July, 1922 arrivals aggregated 1,021,537 tons showing an increase for the past July of 411,282 tons over the same month a year ago. The departing tonnage for July, 1922, was 999,602 tons, showing an increase for July, 1923, over the corresponding month of the previous year of 306,814 tons.

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Surplus Tonnage Problem Confronts Great Britain

Scheme for Disposal of Obsolete Ships Unfavorably Received—British Banks Suffer from Shipping Ventures—Imperial Economic Conference

By a Special London Correspondent

ONE of the most interesting exchanges of views in recent times is taking place in United Kingdom shipping circles on the subject of excess tonnage. It has been put forward that the British Government should make an annual grant of about two and a half millions sterling to provide for the total extinction each year of a million tons of obsolete merchant ships. A process of gradual extermination, spread over a period of four years, is the policy advocated.

The beneficial effect of withdrawing, by degrees, some four million tons gross of "obsolete, uneconomical vessels" from maritime service is regarded by the shipping man responsible for the suggestion as "inestimable." Freights, he states, would be assisted to a profitable level, large sums of money wasted upon costly repairs and renewals to worn-out "Methuselahs" of the mercantile fleet would be saved and set aside, and, to quote, "with the advent of a steady all-round improved shipping position, the production of new tonnage would be warranted, and our shipbuilders and engineers would no longer be among the ranks of the unemployed. And, if Great Britain's useful lead were followed by an international movement towards the same desirable end, so much the better for shipping and the world at large."

Government Meddling Opposed

And so much for the scheme in outline. Frankly, however, it is not meeting with anything like a large measure of sympathy. Its opponents are, in fact, numerous, and decided in their published and unpublished views. Even were Government approval of the plan forthcoming (and this, in the present condition of State engagements and commitments, is regarded as next to impossible) it is felt that to invite the Government to take a "hand" in the conduct of the shipping industry would be asking for trouble. The originator of the scheme gibes at the opposition's fear of the "spectral but affrighting head" of the ghost of Government interference. Yet the danger is none the less real, and for this reason, apart from all others, the plan is scarcely likely to be adopted.

But perhaps the most telling argument against the adoption of the proposal is that shipping people are dead against the institution of artificial measures in endeavoring to remedy the surplus tonnage problem. They hold the view that economic alleviation is only to be found in taking advantage of natural expedients. Curiously enough, the interests whom the scheme is primarily intended to benefit are opposed to the "subsidy" suggestion. One leading builder does not think there is anything in the plan particularly attractive to shipbuilders as a sound economic proposition. If, he says, these millions of tons of vessels are obsolete in the fullest sense of the word, then they may as well be, for practical purposes, deducted from the statistics. As to subsidies, he does not consider that, either for themselves or other industries, shipbuilders will favor the principle.

Ship repairers are not enamored of the proposal—some, indeed, view it with grave doubts. One authority points out that a principal source of employment for ship repairers' workers and their plants is the survey work, which increases with the length of life of the ships. Moreover, this expert fears that shipbreaking, always a speciality and largely carried out on the continent, would prove a poor substitute for this department of their services, the repairs necessary to maintain old ships in a seaworthy and efficient state.

American Proposal Considered Impractical

Plans to rectify the international shipping position, however, are not confined to this side of the Atlantic, and in this regard interest is being displayed here in the New York proposal that there should be a plan of co-operation between American and foreign steamship owners as a remedy for the world's shipping ills. Under this scheme, American and foreign owners would each furnish one-half the tonnage required to move the freight over a particular route, each acting as loading agent for the other, and the ships of each working on an alternative schedule. While the plan would benefit at all events some interests, British shipping people regard it as unworkable, for the reason that no agreement could be come to which restricted the trade to specified vessels at, presumably, specified rates. The originators of the scheme would seem to have made provision for damping the enterprise of any "tramps" which might, consciously or unconsciously, make their appearance where least wanted, but there are reasons for stating that, whatever may be arranged between the principal lines, the tramp would at one stage be bound to enter, incidentally wrecking the agreeing lines' calculations. Furthermore, it is considered that there would have to be a very substantial inducement before British shipowners would agree to exclude all British vessels from trading between America and the East and to the Continent.

English Banks Hard Hit by Shipping Loans

One phase of the shipping position which is becoming more and more clear as the months go by is the part the great banks have played, both during the boom that is past and the slump that is still in evidence. Practically every one of the great banking institutions in England—concerns admittedly expert in regard to general finance, but completely "at sea" where shipping subjects were in question—engaged during the good times in lending fabulous sums of money on vessels which in normal times would realize only a tithe of their boom-time "values." These banks, almost without exception, are now paying very dearly for their inexperience and their excessive indulgence in matters maritime.

But they are clinging to the boats which fate, in the guise of shipwrecked steamship companies, has thrown on their hands. Shipping experts regard this as a foolish policy and condemn the banks, firstly, for advancing tremendous amounts to "mushroom" shipping concerns, and, secondly, for not clearing out of shipping the moment it became evident that the market was going to smash. The banks, however, are most reluctant to relinquish the vessels on which they lent so much money, and, it would seem, intend to hold them indefinitely in the hope of better times.

Meanwhile, an uncomfortably large number of steamship companies are operating on a hand-to-mouth basis; in some cases managers are still running their boats, but they are only enabled to do so in consequence of the indulgence of the mortgagees in refraining from foreclosing and in permitting the managers to continue working on condition that they finance the voyages. Then again, in notable instances, if the income tax authorities exercised their undoubted rights,

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and pressed for payment of the large sums outstanding under this head, there are companies which would be bound to smash.

Incidentally, it would seem that a Norwegian bank has its own little way of getting over the mortgage difficulty, for it is understood to have taken over the steamers, formed them into a company, and placed a friend—presumably a shipping man—in the position of manager.

Excessive Port Charges in Australia a Serious Obstacle

The Chamber of Shipping of the United Kingdom is adopting a strong attitude on the subject of port charges, notably in Australia and New Zealand, where the costs are considered to be out of all proportion. The chamber has observed the continuance of high port charges, light dues, pilotage rates, quarantine expenses, and other terminal costs in Australian ports, "at rates which are far in excess of anything obtaining in this country," and urges upon the Federal and State Governments that such charges constitute a serious obstacle to the free development of Australian trade. Further, it is pointed out that, in respect of all similar charges in the United Kingdom, drastic reductions have been made, so that, speaking generally, charges do not now exceed 40 to 50 percent above pre-war. The instance is cited of an 11,000-ton cargo steamer which, making a stay of five days in port, pays 55 to 62 percent more in dues in the United Kingdom than in 1913, 58 percent more in South Africa, but in Australia 148 percent more. In this connection it may be of interest to note that the dock dues and charges in the principal United Kingdom ports compare as follows with the last pre-war year:

Port	In excess of 1913, Percent
London	47.50
Liverpool	72.00
Glasgow	58.33
Newcastle	70.00
South Wales ports	60.00
Southampton	66.66
Hull and North-East Coast ports	75.00

Eighteen months ago these charges stood at 150 percent above pre-war, but then the shipping and commercial organizations got busy and induced the port authorities to fall into line with declining costs. The people principally concerned fail to see why Australia cannot do the same.

Another leading subject in regard to which the Chamber of Shipping is showing the liveliest interest is in connection with the taxation of shipping profits abroad. The chamber's efforts to induce the Government to introduce legislation with a view to adopting the United States proposal in regard to the exemption of shipping from taxation on a reciprocal basis having met with success, the chamber is now engaged in urging the authorities on this side to do all in their power to persuade all the leading maritime nations to enter into a similar reciprocal arrangement.

Shipping Problems to be Discussed at Economic Conference

As all the world knows, the Imperial Economic Conference is scheduled to be held in London in October this year, and it is satisfactory to note that the future of the shipping industry is to find a prominent place in the weighty deliberations which the conference will doubtless produce. So many things may happen before these lines see print that it would be futile to anticipate to any great extent the probable outcome of the conference. But that is no reason for withholding from placing on record what representative British shipping interests have done, and are doing, in the light of the forthcoming conference.

When Sir Ernest Glover, the President of the Chamber of Shipping, was appointed as a member of the Board of Trade Advisory Committee in connection with the conference, a special committee was appointed by the shipping industry, representative jointly of the Chamber of Shipping and its scarcely less eminent "colleague," the Liverpool Steamship Owners' Association, with the primary object of framing a statement of the views of the industry upon the subjects which it seemed probable would be discussed at the conference. The committee has now embodied its views in a lengthy statement, in the course of which it is reiterated that Government enterprises should be put on an equal footing with private enterprises in all respects—for example, taxation, liability and equality of opportunity—and that the Government of the Empire should be urged to abandon all shipping ventures. State ownership the committee is convinced is injurious to private enterprise and involves either a burden on the taxpayer or higher freights and less efficient services and is a constant cause of international discord.

Discrimination

As to discrimination, the committee maintains that the effective resistance of Great Britain to attempts by foreign countries to impose restrictive and discriminatory measures upon British shipping is limited by the extent to which the Dominions will co-operate with her. A United British Empire, it is felt, could compel discriminating countries to give equal opportunity to British shipping and that under their own or other flags, and it is suggested that the Imperial Economic Conference should agree that all parts of the Empire should stand and act together to secure this.

In regard to air communications the committee is refreshingly brief. Shipping, it says, should be left to itself to deal with the competition of air services. The help given by the State to air services should be only such as is necessary in the national interest.

Financial Difficulties of Prominent Shipyard

The position of the shipbuilding industry of the British Isles may be best summed up in a review of the unfortunate financial affairs of one of the leading companies—Messrs. Workman, Clark and Company, Ltd., of Belfast—as revealed by an official investigation.

To go back to the beginning, rumors circulated that the company would be unable to meet its debenture interest obligations at the fixed date, and, in consequence, the Stock Exchange quotation of the debentures experienced a huge slump. However, the interest was paid on the day on which it fell due, but it transpires that the company was only able to disburse the necessary sum following the sale of a portion of its holding in other companies. Moreover, the sinking fund instalment due on June 1 has not been paid, owing to the fact that the company has insufficient cash available. To add to the trouble, it is now made clear that the Northumberland Shipbuilding Company, Ltd., of Howdon-on Tyne, which owns the whole of the Workman-Clark shares, and which had guaranteed the interest on the Workman-Clark debentures, is unable, owing to financial reasons, to fulfill its obligations.

It was, of course, generally appreciated that, due to the abnormal depression in the shipbuilding industry, companies carrying on this class of business must be having a pretty poor time, but the revelation that, so far as the two companies named are concerned, the situation is worse than was anticipated, caused an unpleasant shock in the shipping and shipbuilding world. What the future holds for either of the companies is, at this writing, not yet clear, but, in regard to Workman, Clark and Company, one point on which there is no doubt is that two or three hundreds of thousands of pounds sterling of new money must be provided if the company is to clear itself of more pressing obligations, and still have capital in hand with which to carry on.

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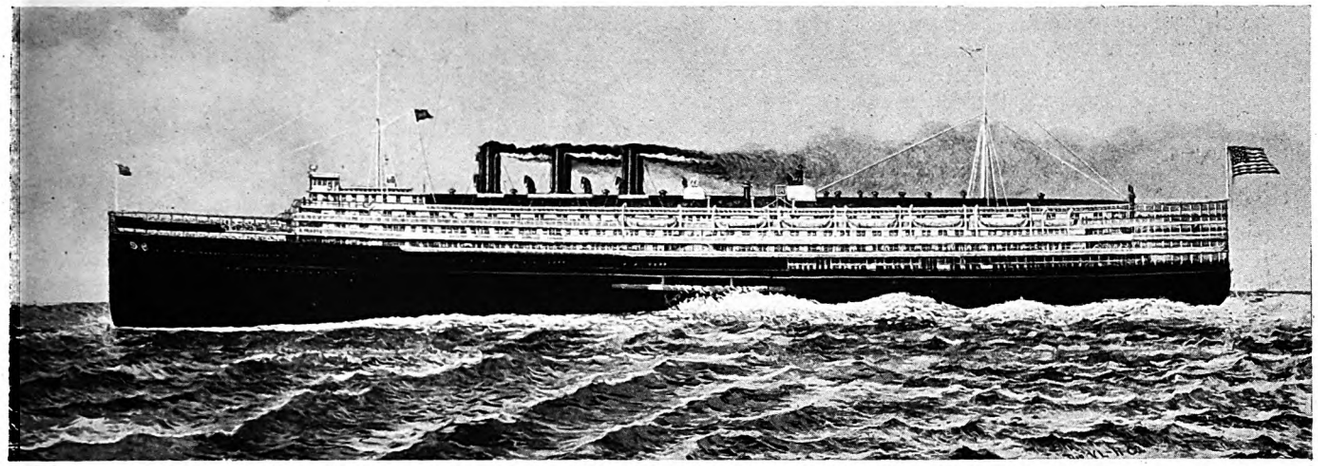

Sketch Showing How the New D. & C. Passenger Steamship Greater Detroit Will Look When Completed

Largest Great Lakes Passenger Steamer Launched

Vessel Is First of Two Sister Ships for D & C Navigation Company and Is First Passenger Steamer Launched on the Lakes Since the War

WITH the launching of the first of the two new steamships of the D & C Navigation Company at Lorain, Ohio, on September 15, the first authentic details of the largest inland waterway steamers in the world were made public by A. A. Schantz, president and general manager of the company. The second of the sister ships will be ready for launching in about three months.

The hulls of these two sister steamships were built by the American Ship Building Company of Lorain, Ohio, and when completed they will compare with many of the transatlantic steamships. Their design is the result of a lifelong study by Frank E. Kirby, the noted authority on Great Lakes steamers. The total cost of each steamer will be about $3,500,000.

The construction of these boats required unusual study to meet the conditions imposed by the high speed run between Detroit and Buffalo, the routes these vessels are to follow being complicated by shallow channels and the traversing of the entire length of Lake Erie. The trip is slightly more than 260 miles and it must be made day in and day out on schedule to meet certain trains. It was also necessary to construct the boats so that they would not only be "floating hotels" but would also carry a large number of automobiles and express freight.

In general, the design follows the conventional side wheel steamer characteristics, having a refined steel hull, carrying a great superstructure of wood supported by braces. It is interesting to note that these superstructure decks are each about three-quarters of an acre in area. The type of the stern is unusual, and has not been used before in this type of vessel, being of an unusual width.

Principal Dimensions

Length overall	550 feet
Beam, molded	58 feet
Beam, over guards	100 feet
Depth	23 feet 6 inches
Cargo capacity	1,000 tons
Number of passengers	about 1,200
Horsepower	10,000
Speed, miles per hour	21

Some idea of the exceptional size of the vessel may be gained from a statement of the number of rooms on the various decks. On the promenade deck there is a total of 205 rooms, including 12 parlors and baths; several others have shower baths. On the gallery deck there is a total of 254 rooms, including 12 parlors and bath rooms. On the upper deck there are 166 double berth rooms, and an entire boat has 650 rooms. The total number of passenger berths and beds number 1,200. In addition to this, there are, of course, a great many accessory rooms not only for the use of passengers, but also for housing and maintaining the crew, and for taking care of the demands of the passengers as well as for the operation of the vessel.

Rudders at Bow and Stern

For steering the vessel there are two rudders, one at the bow and the other at the stern. The rudder at the bow is necessary to facilitate the handling of the boat in narrow waters at each end of the run. The stern rudder is of the balanced type and is operated by twin independent steering engines acting direct on the quadrant. These steering gears are both controlled from the pilot house.

There are eleven watertight compartments in the length of the vessel, formed by steel watertight bulkheads extending from the keel to the main deck. The double bottom is sub-divided into sixteen watertight compartments.

Accommodations for the deck, engineers' and stewards' departments are on a steel deck both forward and aft of the machinery. The freight space is on the main deck forward and the lobby entrance, cafeteria and dining rooms are aft on the main deck, with the galley and pantry on the orlop deck. Passenger accommodations are on the promenade, gallery and upper decks.

Wood Work

In vessels of this type the wood work is a most important item, depending upon a combination of strength, durability, beauty and lightness. To secure these necessary qualities, the principal structure is built of white pine using the best

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clear California redwood for decks and partitions and Oregon fir for other parts.

The following parts are finished in selected figured mahogany: Lobby, main stairs, dining room wainscot, serving stands, cashier's desk and screens, sideboards, hat racks, doors, windows, trim and blinds, purser's office, steward's office with their desks, ticket racks, doors, windows, blinds, berths and fittings; lunch room wainscot, promenade deck salon, including stairs, side cross passages, stanchions and balustrades around wells at gallery and upper decks.

The following parts are finished in walnut: Doors and trim in the main salon, including stairs, rails, balustrades at gallery and upper decks, stanchion and stringer casings. The smoking room will be paneled in maple.

The parlors which have a hardwood finish will be done in the following woods: Two of mahogany, two in white mahogany, one in white maple and one in satinwood. The scheme of paneling and decoration will be of different "periods" in the several suites.

The main lobby will be finished in the Spanish style, and have rubber tiled deck, while the dining room will be in the Colonial style of architecture. In the great central salon the Italian Renaissance style prevails.

Plumbing

As all the rooms are fitted with running water and many with baths, the amount of plumbing work is very great. Water is carried in steel tanks of 36,000 gallons capacity and there are tanks for 8,000 gallons of sterilized water, which after being chilled is pumped to drinking fountains throughout the vessel. Sterilized water is piped to all wash basins and generally throughout the ship. The violet ray system is used for sterilizing.

Heating and Ventilation

As the greater part of the operating season occurs during the heat of summer, the ventilating problem has received very careful attention. Sheet metal ducts lead fresh air to all inside rooms. Fans driven by motors are located on the main deck and drive the air through washers into the ventilation ducts which distribute it to all parts of the vessels.

To prevent as far as possible the heating of the air in the ship, a great deal of money is being spent on the installation of engine and boiler casings and the under side of decks and at other parts of the structure, so that heat will not be conducted to the passenger quarters.

Radiators have also been provided in the public rooms and a heating pipe is run through the outer row of rooms and wing passages in order that heat may be provided when necessary.

Safety Appliances

The entire vessel has been provided with a sprinkler system. In case of fire, fire detectors alarm the watchman of a rise in temperature at any point. The under side of the promenade deck is covered with galvanized sheet steel and fire doors have been provided in the cargo quarters and passages leading to rooms, thus dividing the vessel into zones.

Every room is provided with a telephone connected to a central station in the lobby.

In addition to life rafts and floats, twelve metal lifeboats of 60-person capacity and one metal work boat are carried.

Light and power for various uses are provided by three 100-kilowatt turbo-generators located on the main deck.

Propelling Machinery

The power plant consists of three double end and six single end boilers of the ordinary Scotch marine type, supplying steam for a three-cylinder compound inclined engine, driving side paddle wheels. These engines will develop 10,000 horsepower, and have a piston stroke of 9 feet. The side wheels have a diameter of 32 feet 9 inches, each having 11 paddles 14 feet 10 inches long by 5 feet wide.

The steamer will carry a crew of 300, including officers, and the cargo capacity will be about 1,000 tons. The speed of the boat will be about 21 miles an hour.

There will be two electric elevators, one for serving the linen room and galley and another automatic one between the main deck and galley.

A complete wireless set will be installed in each steamer in a room with accommodations for two operators, and motion picture equipment will be set up on both steamers.

Diesel Auxiliary Yacht Hussar IV

(*Continued from page* 603)

a companionway to the poop deck. The forward deckhouse, located just forward of the mainmast, contains the quarters for the wireless operator as well as the wireless apparatus, and in addition a large and well equipped chart room, having a deck toilet. This deckhouse has also been skillfully used to provide companionways for the officers and crew, thus avoiding the use of unnecessary obstructions on the deck.

One unusual feature of this new craft is the navigating bridge which has been placed just forward of the foremast and from which the captain has at all times an opportunity for navigating the ship without in any way being interfered by or interfering with the comfort of the owner and his guests. This bridge is so placed and so constructed as in no way to be unsightly or to interfere with the proper handling of the vessel under sail.

Accommodations

The arrangement below decks is rather novel, this portion of the vessel being arranged as follows:

The companionway from the after deckhouse runs athwartships and lands just aft of the mizzenmast on the center line of the vessel, there being a fore and aft passageway slightly on the starboard side of the centerline. At the forward end of this passageway the dining room has been placed, which is roughly 16 feet by 21 feet 6 inches.

On the starboard side is a pantry communicating with the crew's quarters as well as with the dining room.

At the after end of the fore and aft passageway and under the poop deck are the owner's quarters, consisting of two large staterooms and two separate bathrooms. These rooms not only have light and ventilation through the air ports and overhead skylights, but in addition have ventilating ports at the forward end where the deck level changes to the raised poop, which will provide excellent ventilation under all conditions.

Forward of the owner's quarters are four large double guests' rooms, each having a separate bathroom. Each of the staterooms and bathrooms is well ventilated not only by air ports but by overhead skylights.

The accommodations for the officers and crew have been arranged so that each department of the ship is segregated by itself, provided with ample and comfortable quarters, all being so arranged as to avoid any unnecessary labor in the maintenance of the vessel and in the service of food both to owner and guests and to officers and crew.

In order to reduce the number of the crew to a minimum, every advantage has been taken of the use of auxiliaries which are electric and include not only a windlass but also electric deck winches for handling boats and for making sail. The *Hussar IV* is lighted by electricity throughout, and is supplied with electric fans in every part of the living space. Forced ventilation is provided for use at sea when air ports and skylights must be closed, and the quarters throughout are heated by hot water. Included in the auxiliaries is an ice-making machine and in addition to ample storage space there is a large chill room, the temperature of which is maintained at any desired point by the use of the refrigerating machinery.

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Applications of Arc Welding to Ship Construction—IV

Comparison of Cost and Percentage of Saving Obtained by Using Welded Instead of Riveted Joints

By E. H. Ewertz*

THE Ewertz type of electric arc welded ship as designed and patented by the author offers many novel features and is a radical departure from any previous design. It was gotten up with the idea, if possible, of eliminating all rivets and the features of construction inherent to riveting; in other words, the design is only adapted to electric welding and the construction is such that riveting cannot be substituted for welding.

It is the author's belief that substituting welding for rivets in a structure designed for using either method is wrong as a basic principle. The results derived from welding in such a method are, at least, partially defeated.

All of the structural shapes such as angle bars, tee bars, zee bars, etc., were designed primarily for convenience in riveting. One flange of an angle bar is used simply as a means of fastening the other flange in its proper position. It is only the outstanding flange that gives stiffness and strength to the plate construction and the flange used for fastening by rivets is valuable only for furnishing the place for the rivets and it does not add to the strength of the structure.

With this in mind, all flanges needed in the riveted structure for fastening are omitted and, in place of angles or other shapes, plates or flat bars are used. To produce reinforcement in many places, flanged plates are used but, in such cases, the flange on the plate performs the service of a stiffener.

The outer shell in this design is formed of metal channels or flanged plates, extending from the bow to the stern which are fastened together with welded butts. The flanges project inward thereby forming longitudinal stiffeners. In addition keelsons and side stringers are suitably placed which together with transverse floor plates and plate frames form the proper construction. Deck construction is similar to side plating, and the whole structure when suitably welded produces an ideal construction that is even superior to that which could be obtained if the vessel were cut out of one solid block, because the fibers of the various parts are flowing in the proper direction. Accompanying sketches give a clear idea of the detail of construction.

Advantages of Ewertz Design

In this as in other designs described, fully half of the welding can be performed before parts are erected and practically all overhead welding is eliminated except that required for filling in. Omission of all holes for fastening and the use of flanged plates in place of plates with bar stiffeners make each section or part much lighter, which reduces the cost of material very substantially. This type of construction also produces a complete ship with relatively few joints, thereby reducing the number of feet of welding. While the details shown illustrate a seagoing barge, these details are just as appliable to any type of ship construction.

A test carried out on a model barge built on 1/12 scale, with all parts in correct proportion, embodying the design above referred to as well as features of a patent now pending covering certain modifications in construction of floors and framing shows a remarkable increase in carrying capacity over that possible in an ordinary design of barge with riveted joints. The test also demonstrated that this type of design gave the structure extraordinary strength which was sufficient as shown in Fig. 81 to carry a 400 percent overload without any marked deflection.

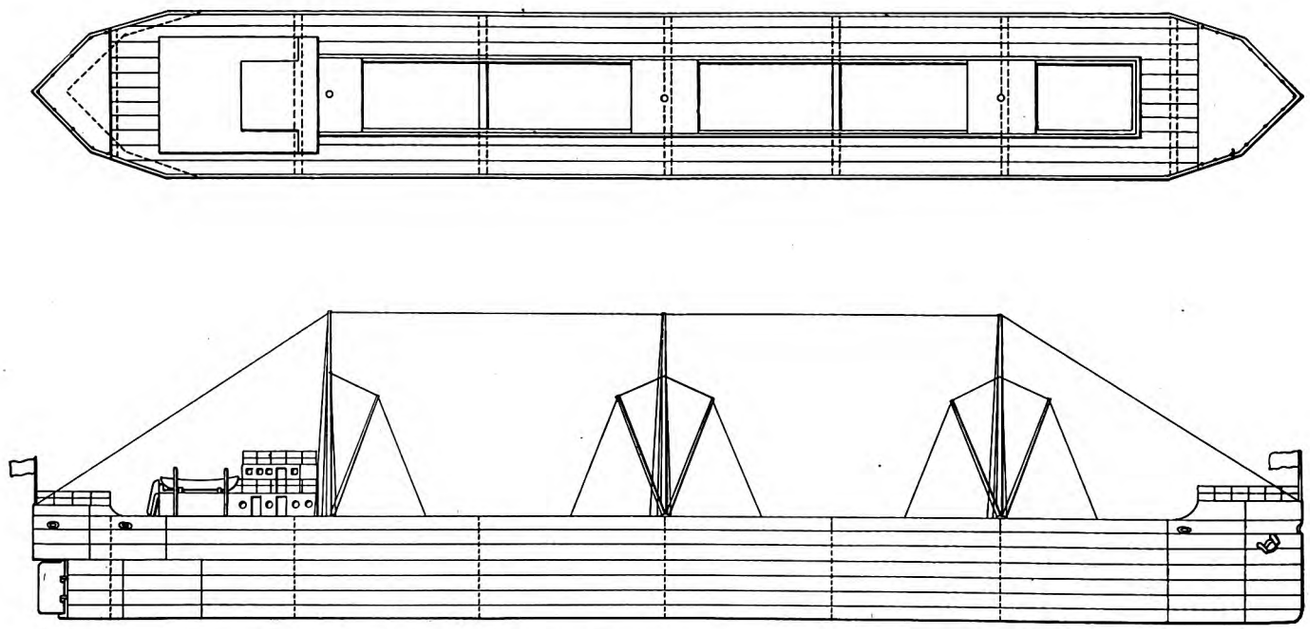

Fig. 76.—Deck and Outboard Profile Plans Ewertz Type of Electric Arc Welded Vessel

*General Manager, Moore Plant, Bethlehem Shipbuilding Corporation, Ltd., Elizabeth, N. J.

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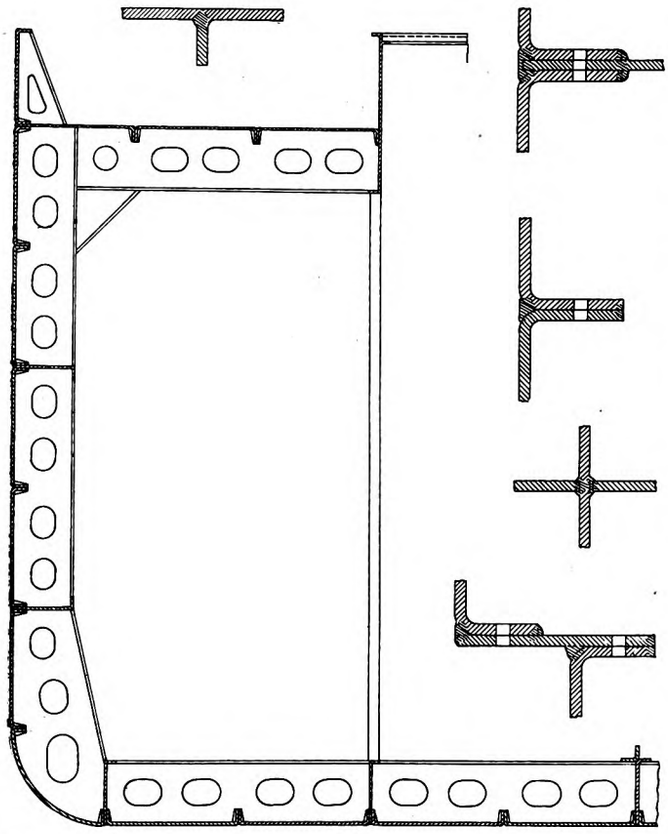

Fig. 77.—Midship Section, Ewertz Type of Electric Arc Welded Vessel

COST DATA

In the preceding pages we have tried to present to the designers and builders of ships what has been done in the past with electric arc welding as well as what might be done by this process, but in order further to assist in the work, we will now give data on the cost as well as on the strength of welded joints, and also a comparison of strength between the riveted and welded joint. Many books and papers have been published in connection with this subject, particularly pertaining to the strength of joints, and in addition to the statements made in this paper, further information on this subject may be obtained from publications in the bibliography which will be printed with the final installment of this article.

In a ship designed for all electric welding, estimates show a saving in weight of structural steel material of over 25 percent as compared with a similar design for a riveted ship. The hours of labor for hull construction show a reduction of over 20 percent. Modified designs, or designs where either riveting or welding can be used, while they clearly indicate a saving, show a saving that is naturally proportionately lower to that obtained in a ship designed for all electric welding.

Mr. Bonner gives some interesting figures in connection with the construction of a 1,200-ton oil barge built by the Tank Shipbuilding Company, Newburgh, N. Y., which are tabulated in the next column.

Major James Caldwell, in a paper read before the Society of Engineers and Shipbuilders in Scotland, with reference to the cross channel barge *AC*-1320 previously described, states: "In labor, 245 man hours were saved in the construction of this barge. More than 1,000 pounds of metal were saved by the substitution of welding for riveting and even greater economy will result when the design is modified to suit electric welded ship construction. Altogether, there were

Estimated Construction Cost of a 166-foot by 39-foot by 8-foot-8-inch Barge

Items		Riveted Design	Welded Design
Plate fitters		$1,236.00	$618.00
Punching and shearing		1,045.00	522.00
Countersinking and reaming		976.00	.....
Riveting		3,427.00	.....
Chipping and calking		523.00	265.00
Smithwork		557.00	275.00
Assembling		2,010.00	1,320.00
Electric power		382.00	95.00
Foreman		360.00	360.00
Plant		.....	300.00
Superintendence		.....	900.00
Rivets		780.00	.....
Liners		142.00	.....
Shed and shoring lumber		.....	145.00
WELDING—Assembling and constructing, 51,300 feet single fillet—			
Welders.. 6,000 hours @ 60c...	$3,600		
Current... 6,000 x 5. 30,000 K. W. H. @ 2½c.....	750		
Wire, 7,200 pounds @ 6½c.....	450	.....	4,800.00
Incidentals		.....	250.00
		$11,438.00	$9,850.00

7,000 lineal feet of welding on the barge and over 3,000 holes required filling-up when the service bolts were withdrawn. The total cost of welding was (based on normal exchange) $1,462.86, comprising: Electrodes, $865.08; electric current, $296.46 and labor, $301.32.

"The cost of assembling similar barges built in the same yard by the ordinary method of construction, including riveting, calking and drilling, was $1,892.48, while in

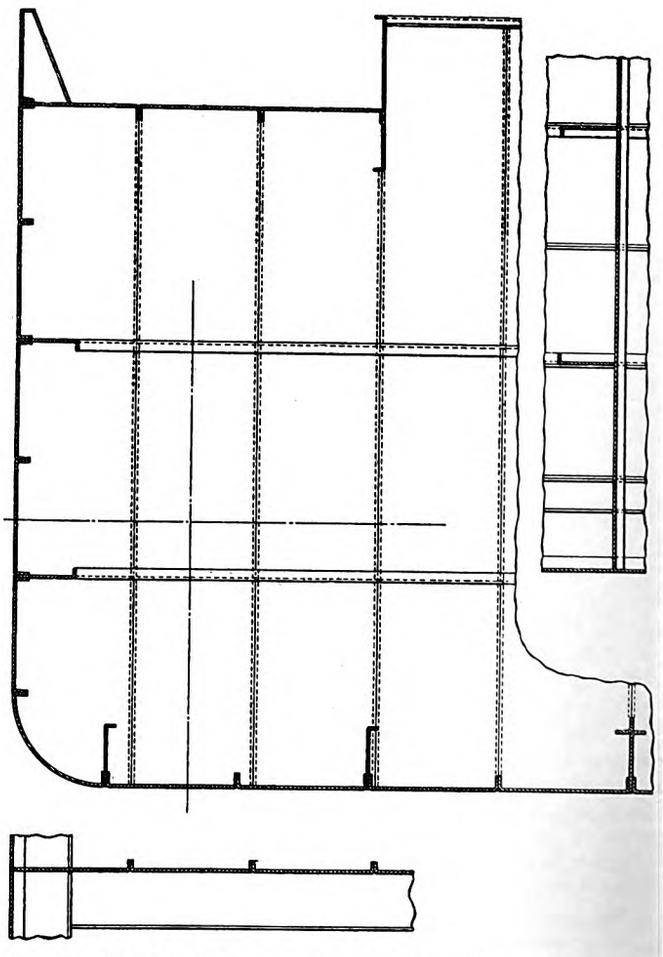

Fig. 78.—Bulkhead Construction, Ewertz Type of Electric Arc Welded Vessel

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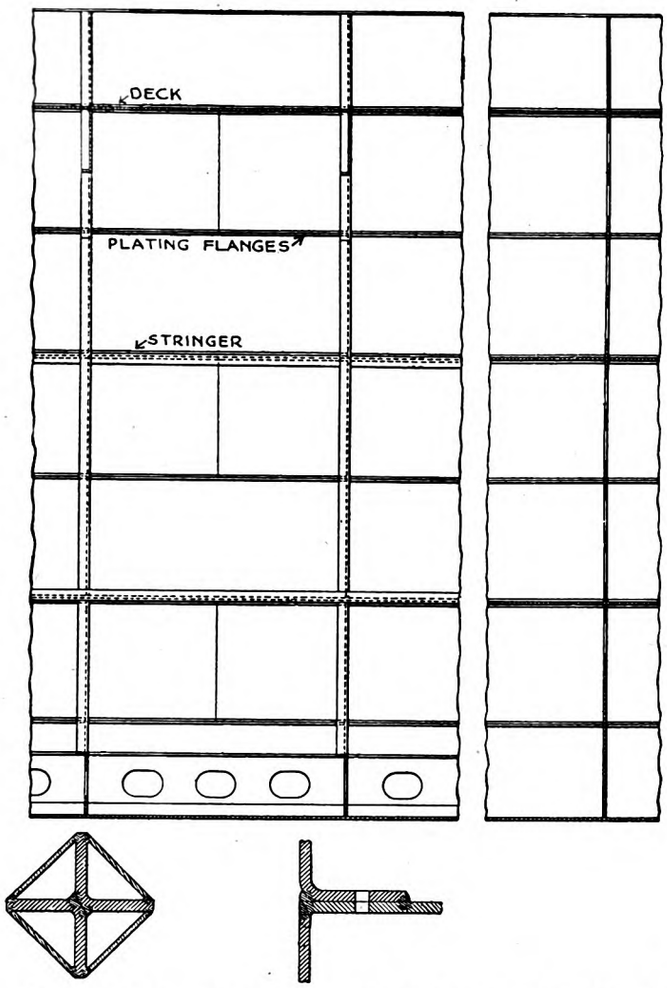

Fig. 79.—Inboard Elevation of Side Construction, Ewertz Type of Electric Arc Welded Vessel

another yard, where 10 barges were built, the average cost was $2,203.52."

Major Caldwell's proposed design of an all electric arc

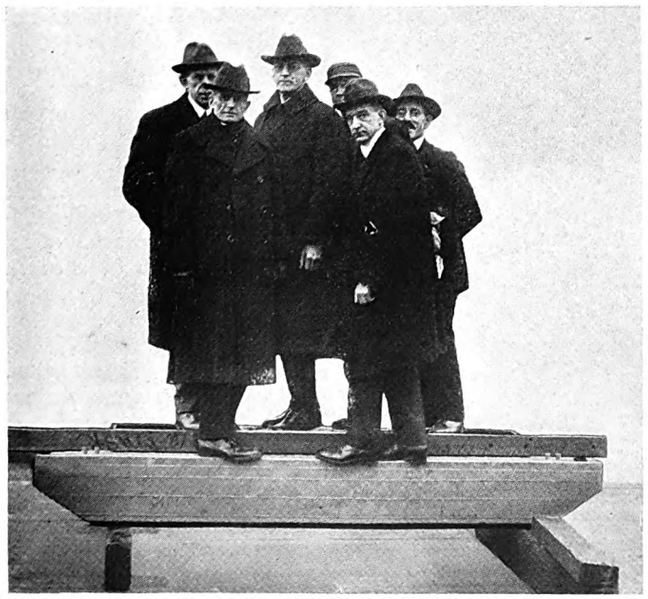

Fig. 81.—Model of Ewertz Type of Electric Arc Welded Vessel Carrying 400 Percent Overload

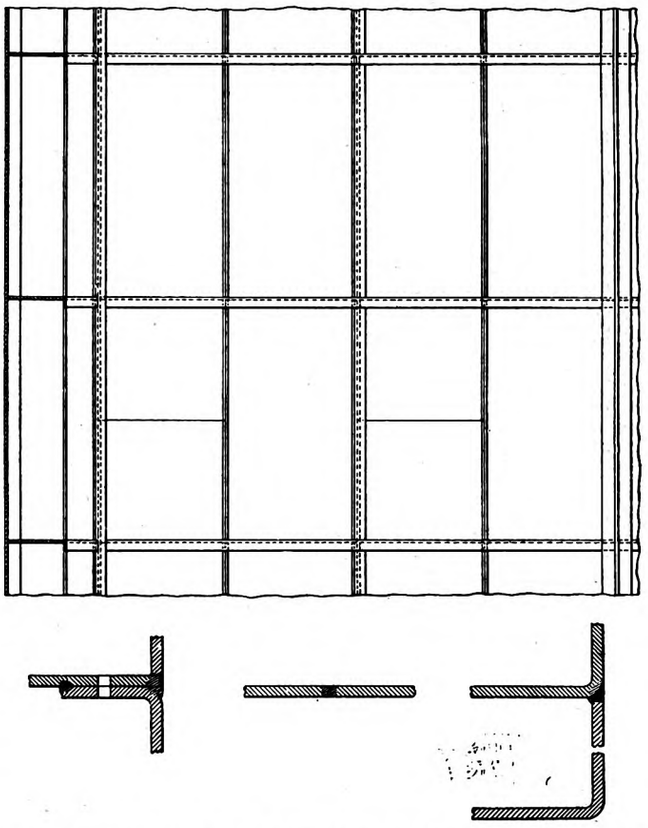

Fig. 80.—Top View of Bottom Construction, Ewertz Type of Electric Arc Welded Vessel

welded 225-ton barge described previously requires the equivalent of 9,000 feet of continuous welding of 5/16-inch plating. Of this amount 4,000 feet can be performed in the field under the best possible conditions, leaving 5,000 feet to be welded after erection. Basing the speed of welding on that obtained in building the cross channel barge *AC*-1320 we have an average of 7 feet per hour per operator on 5/16-inch plating which is very conservative. We have from the above, 1,286 operator hours of total welding time which at 60 cents per hour represents $771.60.

For power and electrodes, accurate figures have been worked up by the Alloy Welding Processes, Ltd., using their flux covered electrode, which show that the cost for 5/16-inch plating is 8.2 cents per foot or $738.

The total cost of welding, therefore, is $1,509.60 or 16.8 cents per foot of welding.

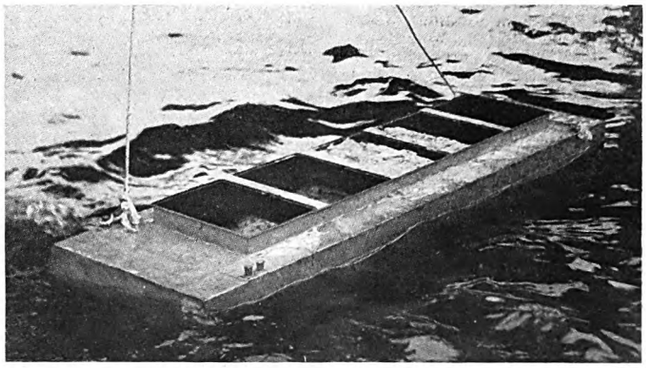

Fig. 82.—Model of Ewertz 400-Ton Electric Arc Welded Barge

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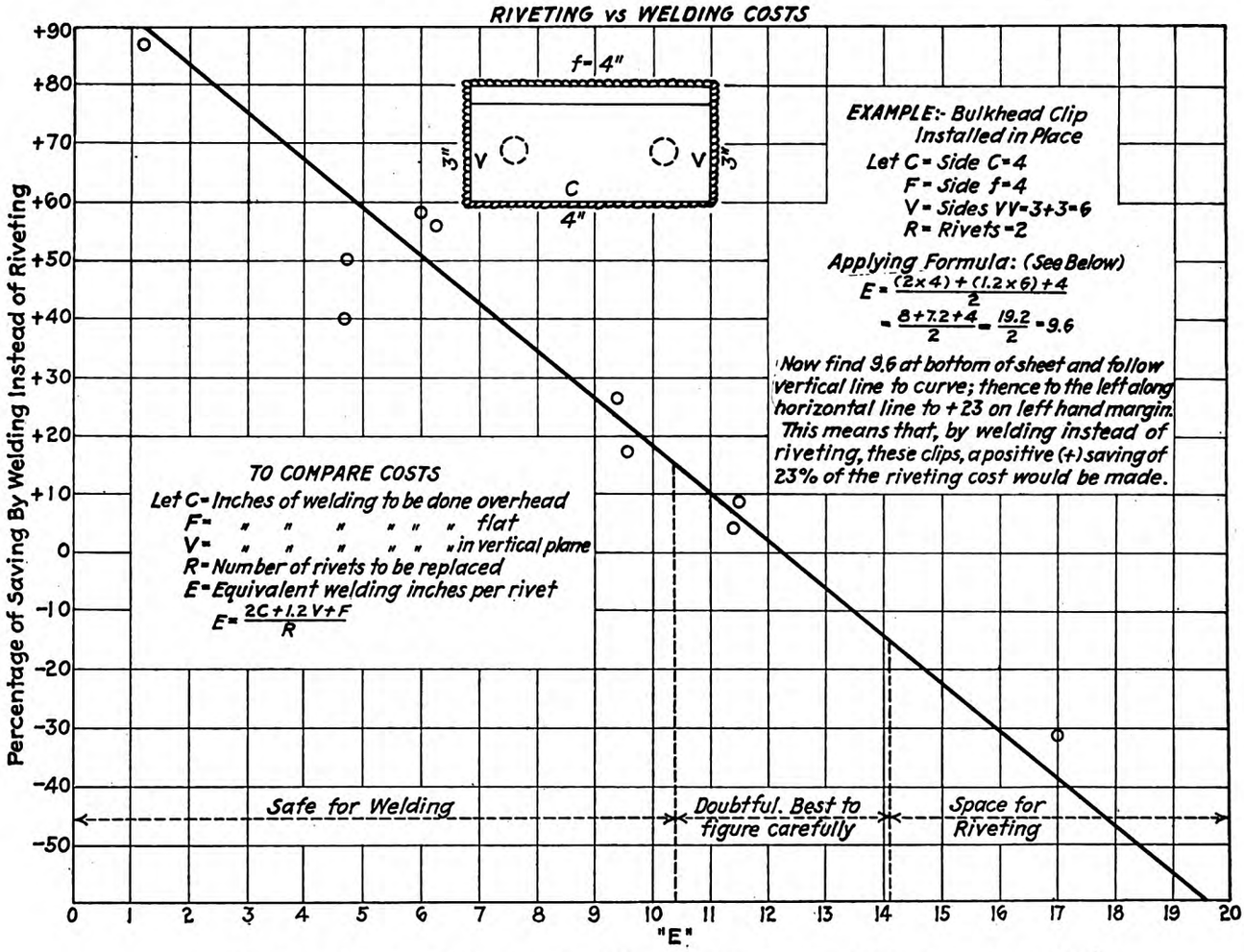
RIVETING vs WELDING COSTS
Percentage of Saving By Welding Instead of Riveting
+90
+80
+70
+60
+50
+40
+30
+20
+10
0
-10
-20
-30
-40
-50
f=4"
3"
V
C
4"
EXAMPLE:- Bulkhead Clip Installed in Place
Let C = Side C=4
F = Side f=4
V = Sides VV=3+3=6
R = Rivets=2
Applying Formula: (See Below)
E = (2×4)+(1.2×6)+4 / 2
= 8+7.2+4 / 2 = 19.2 / 2 = 9.6
Now find 9.6 at bottom of sheet and follow vertical line to curve; thence to the left along horizontal line to +23 on left hand margin. This means that, by welding instead of riveting, these clips, a positive (+) saving of 23% of the riveting cost would be made.
TO COMPARE COSTS
Let C = Inches of welding to be done overhead
F = " " " " " " flat
V = " " " " " " in vertical plane
R = Number of rivets to be replaced
E = Equivalent welding inches per rivet
E = 2C+1.2V+F / R
Safe for Welding
Doubtful. Best to figure carefully
Space for Riveting
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
"E"

Fig. 83.—Chart Showing Percentages of Saving Between the Use of Riveting and Welding

Major Caldwell states that, from reliable figures of riveted construction, he estimates that single riveted lap joints for a barge of similar design would cost 48.6 cents per foot of joint.

Mr. H. Jasper Cox, in a paper read before the Society of Naval Architects and Marine Engineers in November, 1918, states that from certain data obtained by him in England, the results given in the following table, with quasi arc flux covered electrodes, are as follows:

Metal Electrode Arc Welding (Quasi Arc)

Plate thickness, inches	Power used per foot run, amps. at 100 V.	K. W. H. at 3 cents	Electrode per foot run in cents	Labor at 65 cents per hr.	Time per foot of weld	Speed in ft. per hr.	Total cost per ft. of weld in cents
⅛	55	.54c.	7.	2.165c.	2 m.	30	9.7
¼	100	1.35c.	12.9	2.954c.	2 m. 45 s.	22	12.2
⅜	100	4.8c.	19.2	8.66c.	8 m.	7.5	32.66
½	120	7.2c.	25.5	13.00c.	12 m.	5	45.7

In this same paper, Mr. Cox reports figures prepared by the Electric Welding Committee of the Emergency Fleet Corporation.

The Possible Cost of a Fillet Weld on a ½-inch Plate, Using a Motor Generator Set and Bare Electrodes

Average speed of welding on continuous straightaway work ..... 5 feet per hour
Amount of metal deposited per running ft. 6 pounds
Current 150 amperes at 20 volts and 3 kilowatts.
Motor generator eff. 50 percent—

6 K. W. ÷ 5, equals..... 1.2 K.W.H. per 1 ft.run

1.2 K. W. H. @ 3c per K. W. H. equals 3.6 cents per foot
Cost of electrode 10 cents per pound, and allowing for waste ends, etc., equals 7.2 cents per foot
Labor at 65c. per hour, equals..... 13.00 per foot

23.8 per foot

The most complete cost data for electric arc welding was compiled at the Fore River Plant of the Bethlehem Shipbuilding Corporation at Quincy, Mass., under the supervision of Mr. W. S. Wakeman, general manager. Tables 1 to 10 give the cost on various items for both riveting and welding and Table 11 shows the summary of these various jobs. On Fig. 83, the percentage of saving is shown by a curve, and direct comparison is made between the use of welding and that of riveting.

Tables 12 to 24 inclusive (to be published in the next issue) show in tabulated form the time required to weld seams and holes. Great care was taken in making up these various tables and the results were checked from work.

Both the General Electric Company and the Lincoln Electric Company welding machines were used and in all cases, welding was made with bare electrodes.

TABLE 1.—98 Cargo Batten Clips, 14 inches overhead and 6 inches of flat weld against 2 rivets

Welding

	Direct Cost	Overhead Cost
Ship fitting.....	$16.00	$ 8.64
Welding (70 pay hours).....	57.40	31.57

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	Direct Cost	Overhead Cost
Welding wire	8.00	.....
Welding current	6.00	.....
	$87.40	$40.21
Total cost for welding	.....	127.61
Unit cost for welding	.....	1.30
Riveting		
Marking and punching clips in shop	4.90	5.73
Laying out work on longitudinals	9.60	5.18
Drilling longitudinals	4.12	2.22
Electricity for drilling	.49	.....
Ship fitting	6.40	3.46
Bolting and reaming	22.54	12.17
Riveting	11.76	6.35
Air for riveting	1.08	.....
Rivets	1.32	.....
	$69.21	$35.11
Total cost for riveting	.....	97.32
Unit cost for riveting	.....	.99
Total difference favor riveting	.....	30.29
Unit difference favor riveting	.....	.30

TABLE 2.—Twenty Large Awning Pads, 18 inches of welding against 2 rivets

Riveting		
Marking pads for drilling	$.67	$.78
Drilling	.96	.52
Countersinking holes in pads	.40	.22
Laying out holes on boat	5.76	3.11
Drilling holes in deck	.96	.96
Fitting pads	4.40	2.37
Bolting and reaming	4.35	2.35
Riveting	4.00	2.16
Calking	6.00	3.24
Air	1.20	.....
Electricity	.15	.....
Rivets	.40	.....
	$29.25	$15.71
Total cost of riveted pads		44.96
Unit cost of riveted pads		2.25
Welding		
Welding (10 pay hours)	$8.20	$4.51
Fitting	4.40	2.37
Wire	1.33	.....
Electricity	1.00	.....
	$14.93	$6.88
Total cost of welded pads		21.81
Unit cost of welding		1.09
Total difference favor welding		23.15
Unit difference favor welding		1.16

TABLE 3.—115 Vertical-Foot Hand Rail Stanchions, 16 inches of welding against 2 rivets

Riveting	Direct Cost	Overhead Cost
Making holes on stanchions for drilling	$3.83	$4.48
Drilling holes in stanchion feet	5.52	2.98
Countersinking holes in stanchion feet	2.30	1.24
Laying out holes on boat	15.30	8.26
Drilling holes in gunwale and bridge	5.52	2.98
Fitting stanchions	15.81	8.54
Bolting and reaming	24.94	13.47
Riveting	11.50	6.20
Air	6.90	.....
Electricity	.86	.....
Rivets	2.30	.....
	$94.78	$48.15
Total Cost Riveting		142.93
Unit Cost Riveting		1.24
Welding		
Fitting	$15.81	$8.54
Welding (70 pay hours)	61.50	33.80
Wire	10.32	.....
Current	7.75	.....
	$95.38	$42.34
Total Cost Welding		137.72
Unit Cost Welding		1.20
Total Difference favor welding		5.21
Unit Difference favor welding		.04

TABLE 4.—48 Triangular-Based Hand Rail Stanchions, 18-inch flat welding against 3 rivets

Riveting	Direct Cost	Overhead Cost
Marking stanchions for drilling	$2.40	$2.81
Drilling holes in stanchions	3.46	1.87
Countersinking	1.44	.77
Laying out holes on deck	9.60	5.18
Drilling deck	3.46	1.87
Fitting stanchions	6.60	3.56
Bolting and reaming	26.32	14.21
Riveting	14.40	7.71
Air	4.32	.....
Electricity	.54	.....
Rivets	1.44	.....
	$88.38	$37.98
Total cost of riveting		126.36
Unit cost of riveting		2.63
Welding		
Fitting	$6.60	$3.56
Welding (30 pay hours)	24.60	13.28
Welding wire	5.00	.....
Electricity	3.75	.....
	$39.95	$16.84
Total cost of welding		$56.79
Unit cost of welding		1.18
Total difference favor welding		69.57
Unit difference favor welding		1.45

TABLE 5.—Twenty-four Small Awning Pads, 9½ inches of welding against 2 rivets

Riveting	Direct Cost	Overhead Cost
Marking pads for drilling	$0.80	$0.94
Drilling	1.01	.55
Countersinking holes in pads	.48	.26
Laying out holes on deck	6.91	3.75
Drilling holes in deck	1.01	.55
Fitting pads	5.28	2.84
Bolting and reaming	3.48	1.88
Riveting	4.80	2.59
Calking	3.60	1.94
Air	1.00	.....
Electricity	.16	.....
Rivets	.32	.....
	$28.85	$15.28
Total cost of riveting		44.13
Unit cost of riveting		1.84
Welding		
Fitting	$5.28	$2.84
Welding	7.38	4.00
Wire	.60	.....
Electricity	.45	.....
	$13.71	$6.90
Total cost of welded pads		20.61
Unit cost of welded pads		.86
Total difference favor of welding		23.52
Unit difference favor of welding		.98

TABLE 6.—57 Pipe Supports in Fire Water Line, 8 inches of welding against 2 rivets

Riveting	Direct Cost	Overhead Cost
Marking and punching holes in hangers	$3.26	$3.82
Drilling holes in deck	2.40	1.30
Fitting	28.64	15.47
Bolting and reaming	9.04	4.88
Riveting (57)	5.70	3.08
Tapping 57 holes	5.24	2.83
Calking (horizontal feet)	8.55	4.62
Chipping and calking tap rivets	3.99	2.15
Electricity	.75	.....
Air	6.48	.....
Tap rivets	4.35	.....
Rivets	.40	.....
	$79.65	$38.61
Total cost of riveting		118.26
Unit cost of riveting		2.08

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	Direct Cost	Overhead Cost
Welding		
Fitting	$28.64	$15.47
Welding	15.58	8.40
Wire	1.40	.....
Electricity	1.17	.....
	$46.79	$23.87
Total cost for welding		70.66
Unit cost for welding		1.24
Total difference favor welding		47.60
Unit difference favor welding		1.51

TABLE 7.—Twenty-four Pump Room Grating Clips, 17 inches of welding against 2 rivets

Riveting	Direct Cost	Overhead Cost
Marking and punching clips	$2.45	$2.86
Laying out holes on boat and fitting	6.00	3.24
Drilling holes in bulkheads	2.45	1.32
Bolting and reaming	7.25	3.92
Riveting	4.80	2.59
Calking	2.21	1.19
Rivets	.32	.....
Electricity	.22	.....
Air	1.95	.....
	$27.65	$15.12
Total cost of riveting		42.77
Unit cost of riveting		1.78
Welding		
Fitting	$6.00	$3.24
Welding	14.76	8.11
Wire	1.92	.....
Electricity	1.44	.....
	$24.12	$11.35
Total cost of welding		35.47
Unit cost of welding		1.48
Total difference favor welding		7.30
Unit difference favor welding		.30

TABLE 8.—Six Pump Room Pipe Hangers, 36 inches welding against 4 rivets

Riveting	Direct Cost	Overhead Cost
Marking and punching clips in shop	$0.74	$0.82
Laying out holes on boat and fitting	1.50	.81
Drilling holes on boat	.74	.40
Bolting and reaming	1.90	1.03
Riveting	2.40	1.30
Calking	1.17	.63
Rivets	.16	.....
Electricity	.12	.....
Air	.98	.....
	$9.71	$4.99
Total cost of riveting		14.70
Unit cost of riveting		2.45
Welding		
Fitting	$1.50	$0.81
Welding	6.15	3.38
Wire	.80	.....
Electricity	.60	.....
	$9.05	$4.19
Total cost of welding		13.24
Unit cost of welding		2.21
Total saving by welding		1.46
Unit saving by welding		.24

TABLE 9.—92 Fuel Transfer and Drain Pipe Supports, 12 inches welding against 2 rivets

Riveting	Direct Cost	Overhead Cost
Marking and punching holes in hangers	$5.26	$6.16
Drilling holes in deck	3.88	2.10
Fitting	46.30	24.96
Bolting and reaming	14.58	7.86
Riveting	9.20	4.98
Tapping 92 holes	8.45	4.56
Putting in 92 tap rivets	1.37	.74
Calking	13.80	7.46
Chipping and calking tap rivets	6.44	3.47
Electricity	1.41	.....
Tap rivets	7.02	.....
Air	10.45	.....
Rivets	.65	.....
	$128.81	$62.29
Total cost for riveting		191.10
Unit cost for riveting		2.08
Welding		
Fitting	$46.23	$24.96
Welding	39.61	21.90
Wire	5.15	.....
Electricity	3.86	.....
	$94.85	$46.86
Total cost for welding		141.71
Unit cost for welding		1.54
Total difference favor welding		49.39
Unit difference favor welding		.54

TABLE 10.—Fifty Bounding Angle Bosom Pieces, 6 inches welding against 12 rivets—3 inches by 3 inches by 18 inches by ⅜ inch

Riveting	Direct Cost	Overhead Cost
Marking and punching bosom pieces in shop	$11.38	$13.31
Marking and punching bars in shop	.88	1.03
Fitting	17.50	9.45
Bolting and reaming	108.00	58.32
Riveting	24.00	12.96
Calking	17.00	9.17
Material	16.00	.....
Air	13.60	.....
Electricity	8.45	.....
Rivets	8.00	.....
	$224.81	$104.24
Total cost for riveting		329.05
Unit cost for riveting		6.58
Welding		
Chipping	$5.00	$2.70
200 rivets in place	15.80	8.53
Welding (25 pay hours)	20.50	.....
Electricity	3.38	.....
Wire	4.50	.....
	$49.18	$22.50
Total cost welding		71.68
Unit cost welding		1.43
Total saving by welding		257.37
Unit saving by welding		5.15

TABLE 11.—Summary

Name of Fitting	Number Pieces	Rivets Per Piece	Inches of Welding Per Rivet	Total Riveting Cost	Total Welding Cost	Unit Riveting Cost	Unit Welding Cost	Saving by Welding Per Piece	
Cargo batten clips	98	2	10	$97.32	$127.61	$0.99	$1.30	$0.31	—31
Large awning pads	20	2	9	44.96	21.81	2.25	1.09	1.16	51.5
Small awning pads	24	2	4.75	44.13	20.61	1.83	.86	.97	53
Triangular hand rail stanchions	48	3	6	126.36	56.79	2.63	1.18	1.45	55
Vertical hand rail stanchions	115	2	9	142.93	137.72	1.24	1.19	.05	4
Pipe hangers—F. W. line	57	2	4	118.26	70.66	2.08	1.24	.84	40.4
Pipe hangers, drain and fuel	92	2	8	191.10	141.71	2.08	1.54	.54	26
Clips—pump room, pipe hangers	6	4	9	14.70	13.24	2.45	2.21	.24	9.8
Clips, pump room gratings	24	2	8.5	42.77	35.47	1.78	1.48	.30	17
Bounding angle butts	50	..	..	329.05	71.68	6.58	1.43	5.15	78

(*To be continued*)

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Protective Coverings for Shipbuilding Purposes: Paints

By Horace Holden Thayer*

Continuation of a series of articles containing information regarding shipbuilding materials and their uses that is not readily obtainable from shipbuilding handbooks and other generally available sources. The articles are not intended to be a complete exposition of the subject but will be found to contain items of value to the various classes of workers in this field who have to deal with these materials from the materials point of view.

WE have dealt with the principal paints whose services in the marine field require the particular consideration of factors which are of little or no importance on land; and as we are not concerned with the uses of paints in general, the pertinency of the above explanatory note will be particularly apparent in this article.

Some proprietary paints are very good for the services for which they are proposed, but others are poor, and the temptation to adulterate paints in order to meet price competition is hard to resist. The formulæ here given will serve as a guide to good practice.

Exterior Paints, General

The standard paint for a vessel's topsides and other exterior work when white or gray is a white lead and linseed oil paint, which can be tinted as required. A trace of ultramarine added to the paint brings out a clear white color, and the addition of carbon black will produce any desired shade of gray. Considerable amounts of white zinc can be used in place of the white lead with good results. At least two coats should be applied over a priming coat, and three coats should be used on woodwork.

Specifications for this paint adopted in 1917 by the United States Shipping Board Emergency Fleet Corporation are as follows:

Zinc oxide—not less than 25 percent nor more than 50 percent. The remainder may be either basic sulphate white lead or basic carbonate white lead, or a combination of the two.

If desired, there may be substituted for a part of the lead pigments either magnesium silicate, silica, barium sulphate, or calcium carbonate, or a mixture of these pigments, in amounts not aggregating more than 15 percent of the total pigment. In any event the pigment portion of the paint shall contain not less than 85 percent of total lead and zinc pigment.

The vehicle shall consist of pure linseed oil, liquid drier and volatile thinner, which may be either turpentine or mineral spirits, or a mixture of these, no rosin shall be present. The total volatile thinner, including that contained in the liquid drier, shall not exceed 10 percent of the total vehicle.

The paint shall contain not less than 64 percent by weight of pigment and weigh not less than 15¼ pounds per gallon. The paint must be satisfactory in every respect including body and freedom from objectionable settling or caking in can. The paint must have satisfactory working qualities, hiding power, drying, color, gloss and durability.

The United States Navy formula No. 6 "outside white," which weighs about 17 pounds 4 ounces per gallon, is along somewhat similar lines, but is called for only as a final coat. Other coats are their "inside white" formula No. 27 which will be referred to later. Formula No. 6 is as follows:

	1 Gallon
White lead, in oil	5 pounds
Zinc oxide, in oil	9 pounds
Raw linseed oil	3 pints
Mineral spirits	3 gills
Drier	2 gills
Ultramarine blue	1/12 ounce

Specifications for white paint for exterior use adopted in 1918 by the War Service Committee of the Paint Industry are:

Pigment	62 percent
Liquid	38 percent
The pigment portion shall consist of—	
White lead (basic carbonate, basic sulphate, or a mixture thereof)	45 percent
Zinc oxide	35 percent
Aluminum silicate, magnesium silicate, or a mixture thereof	20 percent
The liquid portion shall consist of—	
Raw linseed oil	75 percent
Varnish	10 percent
Drier	5 percent
Turpentine	5 percent
Volatile mineral spirits	5 percent

A trace of ultramarine blue may be added to make a clear white, which is the color desired.

Special requirement: The paint shall weigh not less than 15¼ pounds per gallon.

Where the topsides are black the pigment is carbon black and the United States Navy formula No. 13 for this paint is:

	1 Gallon
Lampblack, in oil	3 pounds 12 ounces
Raw linseed oil	3 pints 1 gill
Mineral spirits	3 gills
Drier	3½ gills

This paint weighs about 8 pounds per gallon.

The topsides and other exterior surfaces of a large number of steel and wood vessels have been coated with black paints which conform to the following specifications, which appear to allow an undesirable amount of pigment adulterant and of thinner and drier. The writer has no data as to how these paints stand up as compared with the United States Navy paint:

Pigment	15 percent
Liquid	85 percent
The pigment portion shall consist of:	
Carbon black	50 percent
Shale black, aluminum silicate, magnesium silicate or mixture thereof	50 percent
The liquid portion shall consist of:	
Pure linseed oil	40 percent
Pure China wood oil	10 percent

The balance shall be combined drier and thinner.

The thinner shall be turpentine or volatile mineral spirits or mixture thereof.

The paint shall weigh not less than 8 pounds per gallon and shall dry within 18 hours after application to a full oil gloss. The carbon black used in the manufacture of this paint must be a good quality, free of grit, shall not contain more than 1 percent of ash and shall be the perfectly calcined product from gas.

All percentages are to be figured by weight.

For spar or spruce color paint, which is used considerably about a vessel, an extensively used formula is about as follows:

	1 Gallon
White lead in oil	14.0 pounds
Yellow ochre in oil	1.4 pounds
Venetian red in oil	.9 ounce
Raw linseed oil	3.0 pints
Mineral spirits	3.6 gills
Drier	1.5 gills

*Member of the firm of Rossell & Thayer, naval architects and marine engineers, Philadelphia, Pa.

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This agrees closely with the United States Navy formula No. 7 for spar color paint, which has a specified weight of 18 pounds 11 ounces per gallon.

Steel decks are preferably protected with two coats of red lead priming paint. Any other paint that may be required is preferably of an abrasive resisting nature such as the boottopping paint referred to in the September issue of this magazine.

Interior Paints, General

When selecting paints for the holds and tween decks of steel ships care should be taken not to have paints that will make the spaces too dark or that will be too light to wear well. Black paints are not desirable for this reason. Gray paints are good for the underside of decks but are not usually desirable elsewhere in cargo spaces. Apart from this feature any good priming paint makes a good hold paint, and in fact some oxide of iron paints that are not desirable as priming paints make very good hold paints for second and third coats. Some proprietary hold paints are the anti-corrosive bottom compositions under another name, and they also give good service as second and third coats on interior steelwork. There are some proprietary paints to which other paints will not adhere but which have excellent anti-corrosive and wear resistant properties; and these also find a good field in holds and similar spaces.

As previously stated, the interior surfaces of wood hulls should not be painted with an oil paint, because the paint plugs up the pores of the wood, and will bring about dry rot, if the wood has not been thoroughly seasoned.

The best pigments for interior paint for accommodations are white lead and white zinc and the best vehicle is linseed oil. The following schedule typifies high grade merchant ship practice for first class accommodations and similar spaces:

1 coat of shellac
1 thin coat of white priming paint with a vehicle about 40 percent linseed oil and 60 percent turpentine
1 white coat of shellac
2 coats of linseed oil paint with pigment 60 percent white lead and 40 percent zinc oxide
1 coat straight zinc oxide and linseed oil paint
1 coat of enamel

For corresponding spaces on government vessels where white the Navy Department requires

1 priming coat
2 coats of inside white, formula 27
1 coat of flat white, formula 29
1 coat of white enamel, formula 30

The formulæ for the white paints are as follows:

Quantities Required for 1 Gallon

	Inside White	*Flat White*	*White Enamel*
White lead, in oil	7 pounds	.....	.....
Zinc oxide, in oil	7 pounds (American)	15 pounds 4 ounces	4 pounds (French)
Raw linseed oil	7⅔ gills	.....	.....
Mineral spirits	8 1/6 gills	3 pints	.....
Drier	1½ gills	¼ gill	.....
Ultramarine blue, in oil	1/12 ounce	2/25 ounce	1/25 ounce
Damar varnish	.....	½ gill	7 pints
Weight per gallon	18 pounds	17 pounds 8 ounces	11 1/16 lbs.

Specifications for flat white and white enamel adopted in 1918 by the War Service Committee of the Paint Industry are:

Flat White

Pigment .....70 percent
Liquid .....30 percent

The pigment portion shall consist of—

Lithopone (containing not less than 26 percent zinc sulphide) .....80 percent
Zinc oxide .....10 percent
White crystalline pigments .....10 percent

The liquid portion shall consist of—

Treated oils and volatiles, or varnishes which produce a satisfactory washable flat finish.

The liquid portion shall contain—

Non-volatiles (not less than) .....20 percent
Volatiles (not more than) .....80 percent

The volatiles shall be turpentine, or volatile mineral spirits or a mixture thereof. Of the total volatiles not more than 2½ percent may be water.

Special requirements: The physical characteristics particularly required are fineness, flowing and flatting. The paint shall weigh not less than 14½ pounds per gallon.

White Enamel

The pigment shall consist wholly of—

Pure French process zinc oxide.

The liquid shall consist of—

High-grade varnish resins or treated oils, with such volatiles as are necessary.

It shall not contain more than 1 percent of moisture in any form.

Special requirements: This enamel shall be clear white and dry with a high lustre, to a tough elastic film, within 12 hours. When brushed onto a panel of clean bright tin and allowed to dry for 48 hours, it shall withstand bending over a rod ⅛ inch in diameter without showing cracking or flaking at the point of bending.

Interior paints are the ones in which there is the greatest cutting of values in order to cut prices. Lithopone is used in cheap paints in place of white lead or white zinc and, where the color will allow, domestic oxides and other earth pigments are used. The linseed oil is reduced by extending it with other liquids, some of which are claimed to make the colors more permanent, and the paint, less affected by moisture.

Some proprietary so-called white leads are over 25 percent barium sulphate, which is nothing but a cheap adulterant. Barium sulphate, silica, asbestine or other cheap white mineral adulterants are usually not objectionable up to about 15 percent of the total pigment, as allowed in the United States Shipping Board outside white paint, provided their presence is understood. The chief objection to their use is that they are not opaque when mixed in an oil vehicle, and they reduce the hiding power of the paint.

There are on the market a number of special paints and systems of painting for interiors and a few of them have given very good results in marine service as well as on land. Their merits cannot very well be gone into here, but when anything of the kind is offered the proposers should be asked to show the results of actual service.

Paints for Special Services

Cork Paint.—For cork painting the coat next to the priming paint has to be a thick coat of a nature to which the cork will adhere well. Subsequent coats are preferably the same as on adjacent surfaces. The Navy Formula No. 51 for the coat directly under the cork is

	1 Gallon
Whiting	7 pounds 5½ ounces
Interior varnish	5 pints 1 gill
Raw linseed oil	1 gill
Drier	1 gill
Weight per gallon	12 pounds 5 ounces

The grains of cork should pass through a No. 8 sieve but be large enough to be held on a No. 12 sieve.

Paint Under Doublings.—This paint is also of a special nature with good body and waterproofing qualities, and there are proprietary paints on the market for this service.

Seam Cement.—Some of these proprietary compositions offered for both steel and wood ships are of the nature of paints and are preferable to ordinary paints for filling in calking seams, cracks and abrasions on wood ships.

Stack Paint.—Paint for stacks and other particularly hot surfaces is preferably of a special nature and usually contains litharge. Proprietary paints for this service are on

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the market, and the Navy Department has the following formulæ for spar color and light gray stack paints, Nos. 8 and 10 respectively:

No. 8	1 Gallon
Silica, dry	2 pounds
White lead, in oil	6 pounds
White lead, dry	6 pounds
Yellow ochre, in oil	1 pound 4 ounces
Litharge	1 pound 4 ounces
Boiled oil	10 gills
Mineral spirits	8 gills
Venetian red, dry	1 ounce
Weight per gallon	20 pounds 10 ounces

No. 10	1 Gallon
White lead, dry	4 pounds 13 ounces
Zinc oxide, dry	1 pound 14 ounces
Lampblack, dry	1½ ounces
Litharge	5¾ ounces
Kerosene	2 quarts
Drier	2½ gills
Damar varnish	1 quart
Weight per gallon	13 pounds

Waterproofing Canvas.—Special compounds of proved merit should be used for this service.

Canvas Preservative.—The Navy Department has a preservative compound for white canvas and a preservative light gray canvas paint of the following formulæ, No. 20 and No. 21 respectively:

	1 Gallon	
	No. 20	No. 21
Paraffine, crude (melting point 103-105 deg.)	1 pound 12 ounces	1 pound 12 ounces
Paraffine oil (specific gravity, 865)	4 gills	4 gills
Mineral spirits	10 gills	10 gills
Kerosene	10 gills	10 gills
Zinc oxide, dry		7 ounces
Lampblack		7/10 ounce
Weight per gallon	7 pounds 14 ounces	8 pounds 3 ounces

Machinery.—Paint for main engines and auxiliaries, ice machines and other inside machinery is preferably a varnish vehicle paint.

Inside of Water Tanks.—Many special compounds are available for this purpose. One of these, of the nature of a thin bodied varnish, has shown up well in combination with Portland cement. Another, which is a rubber composition applied hot, has given good results. Bituminous compositions are good for this service. The Navy Department requirements for the washing out of fresh water tanks which have been coated with bituminous solution and enamel have been stated in the June, 1923, issue of this magazine.

Inside of Boilers.—Coatings for the water and steam surfaces of firetube boilers are on the market in considerable numbers but their merits should be carefully investigated. Some of them are used and recommended by the engine room personnel after satisfactory trial. One chief engineer will swear by a cement wash made up of Portland cement and fresh water only. Another will not tolerate cement in his boilers and considers a coating of metallic zinc powder mixed up in clean fresh water to be the only thing. Another has obtained such good results with white zinc mixed up in kerosene oil that he will not use anything else. Another uses a mixture of cement and lime, half and half, in hot water, about the consistency of white wash, with a handful of tallow to the bucketful to keep them in suspension.

Varnish

A good specification for spar varnish, the principal varnish required on shipboard, was given in the first section of this article appearing in the July issue. There are, however, a number of good proprietary varnishes on the market of which Valspar is generally conceded to be the best. Lists of approved spar varnishes will often include the following:

Valspar	Valentine & Company
Wood oil coating No. 1	Glidden Varnish Company
Aero Rex spar	Sherwin-Williams Company
Spar varnish	Colonial Works
Spar varnish	Howe Varnish Company

Damar varnish is used in paints for inside work and the Navy Department specifications for this varnish embody the following requirements:

Composition

The varnish shall consist exclusively of a solution of pure damar resin in petroleum spirits (turpentine substitute), and be absolutely free from all foreign matter. It shall contain not less than 55 percent nor more than 60 percent by volume of petroleum spirits.

Physical Characteristics

The varnish when poured on a dry glass plate held in a position inclined 30 degrees to the vertical shall set to touch in not more than 30 minutes. It shall not flash below 105 degrees F., when tested in an open tester by Tagliabue's method.

Comparison with Standard Samples

The varnish shall be equal to the standard sample on hand at the various navy yards, in body, clearness, lightness of and freedom from color; and when mixed with French white zinc: in flowing qualities, covering properties, gloss, finish, and durability.

Mixing varnish called for by the Navy Department in its formulæ for boottopping paints has the following specification requirements:

Quality

Mixing varnish shall be made of high-grade material, of good manufacture, and free from any ingredients which may affect its suitability as a mixing varnish for boottopping paint.

Physical Properties

The varnish shall be clear and free from sediment or suspended matter. When flowed on glass plate placed at 30 degrees to the vertical the material shall not come off when touched lightly with the finger after two hours, and shall dry elastic in from 12 to 16 hours at a temperature between 60 degrees and 80 degrees F. The varnish shall mix readily with the pigment and remain in solution when mixed. When tested in an open tester by the method known commercially as "Tagliabue's method" it shall not flash below 100 degrees F. When mixed and ground as per the following formula—for one gallon—

Mixing varnish	2 pints
Drier	2 pints
Petroleum spirits	2⅜ pints
Lampblack, in oil	31½ ounces
White zinc, American, dry	30 ounces

the boottopping paint shall in service retain its color and body and shall not flake or peel off due to the alternate action of the water and air. When applied to the steel plating the boottopping paint shall dry sufficiently within 4 hours to permit of the application of a second coat.

General Composition

The base of the mixing varnish shall be either china wood oil or linseed oil, or both, and varnish resins or such other ingredients as may be deemed essential by the manufacturer to produce a mixing varnish complying with the requirements of paragraph 3 (just above.)

Acceptable Brands of Mixing Varnish

Bids for mixing varnish will be considered from only those manufacturers whose mixing varnish has been found, after service tests, to be satisfactory for the purpose, and the department reserves the right to reject any bids based on varnishes which are unknown or have not been subjected to the required service tests.

Varnish for inside bright finish work goes by the name of interior varnish, and Navy Department requirements for it are a good guide for the selection of varnishes that may be expected to give good results. They are as follows:

Materials

The manufacturer is given wide latitude in the selection of raw materials and processes of manufacture, so that he may produce a varnish of the highest quality.

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GENERAL REQUIREMENTS

(a) The varnish shall be suitable for general interior use, including both rubbed and unrubbed finish, exclusive of floors. It must be capable of easy application with a brush in the ordinary manner, according to the rules of good standard practice, must flow out to a good level coat, free from runs, sags, pits, or other defects, and dry with reasonable promptness to a hard, somewhat elastic glossy coating which can be rubbed in 48 hours or less.

(b) The varnish shall be clear and transparent and not darker in color than a solution of 3 grams of potassium dichromate in 100 cubic centimeters of pure sulphuric acid, specific gravity 1.84.

(c) It shall have a flash point (closed-cup) of not below 32.2 degrees C. (90 degrees F.) and shall contain, by weight, not less than 45 percent of non-volatile matter.

(d) The varnish shall set to touch in not more than 4 hours, dry hard in not more than 24 hours, and dry to rub in not more than 48 hours, under standard conditions of temperature and humidity.

(e) The film on metal shall stand rapid bending over a rod 3 millimeters (⅛ inch) in diameter.

(f) The varnish shall have good brushing, flowing, covering, leveling, and rubbing properties, and shall show no impairment of lustre or other defect when used where natural or illuminating gases are burned or when subjected to air currents during the process of drying or application.

(g) The dried film shall stand application of cold water for not less than 18 hours without whitening or showing other visible defects.

TESTS

(a) Deliveries will, in general, be sampled and tested by the following methods, but the Department reserves the right to use any additional available information to ascertain whether the material meets the specifications.

(b) It is mutually agreed by buyer and seller that a single package, out of each lot of not more than 100 packages, be taken as representative of the whole. Whenever possible, an original unopened container shall be sent to the laboratory, and when for any reason this is not done the inspector shall thoroughly mix the contents of the container sampled, transfer not less than 1 quart to a clean dry glass bottle or tin can which must be nearly filled with the sample, securely stoppered with a new clean cork or well-fitting cover or cap, sealed, and distinctly labeled by the inspector.

(c) The inspector should take a duplicate from the container sampled, to be held for check in case of dispute, and, when requested, should take a sample for the seller.

(d) The tin panels used in the following tests shall be cut from bright tin plate weighing not more than 25 grams nor less than 19 grams per square decimeter (0.51 to 0.39 pound per square foot). (Bright tin plate, 0.0109375 inch, should weigh about 0.44 pound per square foot. It is important that the tin plate used shall be within the limits set.)

(1) *Appearance.*—Pour some of the thoroughly mixed sample into a clear glass bottle or test tube and examine by transmitted light. The varnish must be clear and transparent.

(2) *Color.*—Prepare a standard color solution by dissolving 3 grams of pure powdered potassium dichromate in 100 cubic centimeters of pure concentrated sulphuric acid of specific gravity 1.84. Gentle heat may be used, if necessary, to perfect the solution of the dichromate. The standard color solution and a sample of the varnish to be tested shall be placed in clear, thin-walled glass tubes of the same diameter. The color comparison shall be made by placing the tubes close together and looking through them by transmitted light. The tubes used for this test should be 1.5 to 2.0 centimeters (⅝ to 13/16 inch) in diameter and shall be filled to a depth of at least 2.5 centimeters (1 inch). (Since the potassium dichromate-sulphuric acid must be freshly made for this color comparison, it is frequently more convenient to compare samples with a permanently sealed tube of varnish which has previously been found to be slightly lighter in color than the standard solution of 3 grams dichromate in sulphuric acid. When samples are found to be darker than this standard tube of varnish, the dichromate standard should be made up for final decision.)

(3) *Flash Point.*—Determine with either the "Tag" or Elliott closed-cup tester. The former is preferred.

(4) *Nonovolatile matter.*—Place a portion of the sample in a stoppered bottle or weighing pipette. Weigh container and sample. Transfer about 1.5 grams of the sample to a weighted flat-bottomed metal dish about 8 centimeters (3.1496 inches) diameter (a friction-top can plug). Weigh container again and by difference calculate the exact weight of the portion of sample transferred to the weighed dish. Heat dish and contents in an oven maintained at 105 degrees to 110 degrees C. (221 to 230 degrees F.) for three hours. Cool and weigh. From the weight of the residue left in the dish and weight of the sample taken, calculate the percentage of nonvolatile residue.

(5) *Drying time.*—Pour the varnish on a clean glass or bright tin plate not less than 15 centimeters (6 inches) long and 10 centimeters (4 inches) wide. Place the plate in a nearly vertical position in a well-ventilated room, but not in the direct rays of the sun. The temperature of the room should be from 21 to 32 degrees C. (70 to 90 degrees F.). In cases of rejections on drying time, standard conditions of temperature and humidity shall be 70 degrees and 65 percent, respectively. The setting and drying time specified shall be obtainable under these conditions. The film is tested at points not less than 2.5 centimeters (1 inch) from the edges of the film by touching lightly with the finger. The varnish is considered to have set to touch when gentle pressure of the finger shows a tacky condition, but none of the varnish adheres to the finger. The varnish is considered to have dried hard when the pressure that can be exerted between the thumb and finger does not move the film or leave a mark which remains noticeable after the spot is lightly polished. If rapid light rubbing breaks the surface, the sample is considered not to have satisfactorily dried hard. In case the test shows time of setting to touch or drying hard more than 4 and 24 hours, respectively, two additional tests shall be run on different days, and if the varnish does not meet the above drying and hardening requirements on both of these additional tests, it shall be considered unsatisfactory.

(6) *Toughness.*—Thoroughly clean, with benzol, a sheet of bright tin 7.5 by 13 centimeters (about 3 by 5 inches). Flow the varnish on one side of the tin plate and set in a vertical position in a well-ventilated room, not in the direct rays of the sun, at a temperature not below 21 degrees C. (70 degrees F.).

After the varnish on the tin plate has dried for 48 hours bring to a temperature between 21 and 24 degrees C. (70 to 75 degrees F.), and with the varnish film on the outside bend rapidly over a rod 3 millimeters (⅛ inch) in diameter. The film must show no evidence of cracking or flaking.

(7) *Water resistance.*—Prepare a panel as in (6) and let it dry in a well-ventilated room for 48 hours. Place the panel in a beaker containing about 2.5 inches of distilled water at room temperature (immersing the end of the panel which was uppermost during the drying period) and leave in water for 18 hours. The varnish shall show no whitening and no more than a very slight dulling when observed after removing the panel from the water and drying for 2 hours.

(8) *Flowing and rubbing properties.*—Thoroughly clean, with benzol, a glass plate about 15 by 20 centimeters (6 by 8 inches). Flow the varnish so as to entirely cover one side of the panel and stand in a nearly vertical position with the long edge horizontal for 8 minutes. Then draw lightly a 25 millimeters (1 inch) section of a hard-rubber comb (having 8 to 10 teeth to the centimeter) horizontally across the varnish surface, first 2 centimeters (0.7874 inch) from the bottom and then 2 centimeters (0.7874 inch) from the top of the plate. Let panel stand in the same position for 20 minutes longer, then lay flat. An exaggerated condition of a dusty room shall be created by rubbing some cotton batting between the hands immediately over the panel. Let panel dry for a total of 48 hours in a well-ventilated room. If the comb marks show at this time, the varnish shall be rejected. If no comb marks show, the surface shall then be rubbed with pumice flour, water, and a felt pad with long, even, firm strokes back and forth in one or another direction, but not in circles, until every portion of the panel has been rubbed. Most of the pumice will then be removed from the pad and panel, and the varnish film given a "water rub" with the pad.

A satisfactory rubbing varnish in the above test will yield a smooth, dull film even at those places where the dust particles have been encrusted in the film, and shall show no spots where the pumice has been ground into and become attached to the film, nor show any other evidence of gumming. No sweating shall occur anywhere on the film in 18 hours after rubbing.

(9) *Gas test—Apparatus.*—The necessary apparatus consists of a glass bell jar approximately 20 centimeters (8 inches) in diameter and 30 centimeters (12 inches) in height, inside dimensions, having a ground-glass rim; a ground-glass base plate of suitable size; a small kerosene glowlamp without chimney or a small alcohol lamp filled with kerosene, using a round wick not over 6 millimeters (¼ inch) in diameter and adjusted to give a flame 2 centimeters (4/5 inch) in height. A wire or a light wooden frame is fitted inside the jar and provided with a support for holding a disk of tin plate 15 centimeters (6 inches) in diameter in a horizontal position 5 centimeters (2 inches) above the wick of the lamp. The frame must also be provided with several other supports above this disk for holding in a horizontal position the various varnished panels under test. The test panels consist of semicircular pieces of bright tin plate approximately 15 centimeters (6 inches) in diameter.

The form and arrangement of the above apparatus is designed to provide an even distribution of the products of combustion over the test panels.

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Method.—First determine the normal time required for the varnish under examination to set to touch at room temperature. Divide this time by 5 to arrive at the different drying periods at which the varnish is to be tested in the gas tester. Thus, if a varnish sets to touch in 5 hours, samples should be tested for resistance to gas at drying periods of 1, 2, 3, and 4 hours; it is needless to use the fifth or 5-hour period for the above varnish, as a varnish which has set to touch is practically immune to injury from gas fumes. Similarly a varnish which sets to touch in 1 hour should be tested for resistance to gas at drying periods of 12, 24, 36, and 48 minutes.

Example.—A varnish which sets to touch in 5 hours is tested as follows:

First, clean two of the semicircular, bright, tin-plate panels carefully with benzol. Flow the varnish on one-half of panel No. 1 at say, 10 A. M., and allow to drain in a nearly vertical position at room temperature. At 11 A. M. flow the varnish on the other half of panel No. 1; allow to drain as before. At 12 M. varnish one-half of panel No. 2 and at 1 P. M. varnish the other half as above. At 2 P. M. place the two panels close together in a horizontal position on the upper supports of the frame. Light the lamp and set it under the circular tin. Place the bell jar in position, centering it as nearly as possible, properly seated on the ground-glass plate. If the chamber is tight and lamp properly adjusted, the flame will be extinguished in about 4 minutes. After the panels have been in the chamber for half an hour, remove the bell jar and examine the varnished panels for gas effects.

The varnish on all four sections should remain bright and clear without trace of pitting, "crow's footing," frosting, or other defects.

PACKING AND MARKING

(a) Varnish shall be delivered in 5-gallon or 1-gallon tin cans, as specified, packed 10 gallons per case.

(b) Five-gallon cans and cases for same shall be made in accordance with the latest issue of Navy Department Specifications for Five-Gallon Tin Cans and Shipping Cases.

(c) One-gallon cans and cases for same shall be made in accordance with the latest issue of Navy Department Specifications for One-Gallon Tin Cans and Shipping Cases.

(d) Each can shall be labeled with the name of the material, the quantity, and the name of the manufacturer.

(e) Cases shall be marked with the name of the material, the name of the contractor, and the contract or order number under which delivery is made.

(*To be continued*)

Insurance Cases Adjusted in Court Attract Attention

Unusual Circumstances Involved in Establishing Loss Claims —London Underwriters Hard Hit—Lake Grain Situation

By "Bordereaux"

THE value of the *Proteus,* which was wrecked by collision with the *Cushing* on August 19, 1918, has been increased by $500,000 and is now fixed at $1,225,000 by authority of the United States Circuit Court of Appeals, Second Circuit, thus modifying the decree of the lower tribunal. The Southern Pacific owned the *Proteus,* and the Standard Oil the *Cushing* the former was a total loss, and the underwriters have paid on account of both hull and cargo. The cargo owners were represented in the appeal by Bigham, Englar and Jones. The action was of interest to them because additional recovery from the carrier is made possible by the increase in value.

The *Proteus* was insured under full form for $600,000, half being placed in this market and half abroad. She was also insured 15 percent on disbursements, largely here.

London Underwriters Hit

LONDON underwriters will have a big loss to face in the case of the steamer *Ferrara,* practically destroyed by fire near Sabang. So far as can be gathered, a shipment of opium from Persian Gulf to Macao, insured on a value of about £200,000, has been destroyed. Practically the whole loss will fall on the London market. Another cause for anxiety was the stranding of the steamer *Magicstar,* one of the fleet owned by the Union Cold Storage Company, which ran ashore in the Yang-tze-kiang, after leaving Hankow, with nearly 4,000 tons of eggs in refrigeration. This cargo may be worth over £200,000. Up to 20 guineas was paid against the risk of total loss of the steamer, and 40 guineas against the risk of total loss of the cargo, but the rate dropped to 5 guineas on the hull before she was floated. The steamer was of 5,534 tons, and is insured on a value of £100,000. The owners run the risk of particular average, and also part of the total loss risk. The steamer *Cid,* which ran ashore on the south coast of the Straits of Gibraltar, near Cires Point, when bound from Spain to London, was quoted at 35 guineas against the risk of total loss, but was refloated after the rate had dropped to 10 guineas. The steamer was of 1,847 tons, and owned by the Macandrew Line, being insured on a value of £65,000.

Establishing Loss Claims

THE following case, decided in the English courts, in which an American company was involved, has attracted considerable attention in this country:

In the King's Bench Division on July 24, Mr. Justice Rowlatt delivered judgment in the case of Zachariessen v. Importers and Exporters Marine Insurance Company and others.

Plaintiffs insured with defendants a vessel carrying a cargo of coal from Newport News to Gothenburg "against mine risks only as per Norwegian conditions, including missing." The vessel left Newport News on October 1, 1920, and was never again heard of. Plaintiffs claimed for a loss under the policy contending that they could recover, if the ship was "missing" from any cause whatsoever, but defendants argued that they were only liable, if the vessel was missing by reason of damage caused by a mine.

Council for defendants submitted that the words "mines only" were words of definition and exclusion and limited the range of the insurance. The evidence showed that the vessel was already fully insured in Finland against ordinary marine risks, and there would be no need to take out this policy in relation to such ordinary risks. The intention clearly was that this policy should cover only the risk of mines. On the facts it was improbable that the ship was lost by anything but an ordinary peril of the seas. At that time there were several derelicts drifting about the Atlantic and, if this vessel had struck one of them in the dark, she would, with her heavy cargo of coal, almost certainly have sunk at once. To say that the ship was lost owing to striking a mine was mere conjecture, and that was not enough to make the underwriters liable. There must be a legitimate inference from the known facts.

In his judgment Mr. Justice Rowlatt said that the only point for decision was the construction of the words "mines

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only, including missing." On the question of burden of proof there was really no difficulty or obscurity in principle. If a ship was no longer to be found afloat she must have sunk, and if it was desired to claim for a loss from some cause other than an ordinary peril of the sea, the claimant must prove a loss by that specific cause. The proof might be given by direct evidence, or it might be given by inferential evidence; and inferential evidence might be very strong. The contention of the plaintiffs was that the underwriters had agreed that, if the ship was missing and nothing further was known, it should be presumed in the plaintiff's favor that the loss was due to a mine. The contention of the defendants was that there must be inferential evidence of a loss by mine before the defendants could be liable. On the whole, he thought that the contention of the plaintiffs was right; the underwriters, in effect, agreed that, if the ship was missing and if nothing else was known, it should be presumed that the loss was attributable to a mine. There must therefore be judgment for the plaintiffs. On the facts, he could not agree with the plaintiffs that there was anything to show that the loss was due to a mine; there was really no evidence from which that could be inferred, and it was a mere guess.

Lake Grain Situation

ONE of the subjects to which New York marine underwriters have given most attention this summer has been that of the lake grain situation. An important special meeting was held in the Board Room of the Board of Underwriters of New York for the purpose of considering the effect upon the American marine market of the recent legislative action of the Canadian I arliament with respect to vessel charterers. Charles R. Page, of the Fireman's Fund, presided; about thirty were present. The outcome of the discussion was to charge Chairman Page with the appointment of a committee of three, who will investigate the whole matter and report back their findings.

Mr. Page's committee selection was as follows: Chairman, Hendon Chubb; Galloway C. Morris, third vice-president of the Insurance Company of North America, and W. J. Roberts, United States manager of the Standard Marine of Liverpool.

The measure passed by the Canadian Parliament on June 30 is entitled "Inland Water Freight Rates Act, 1923." The section that especially interests the underwriters and brokers is No. 7. That section, and the penalty provided for its violation, are as follows:

It shall be unlawful for any person who is a vessel broker or person engaged or acting as agent or otherwise in the chartering of any vessel or in contracting for the hire or letting of cargo space for the carriage of grain from Fort William or Port Arthur to any port or place in Canada or in the United States by lake or river navigation to solicit any risk, or to issue or deliver any receipt or policy of insurance or to collect or receive any premium in whole or in part, or to inspect any risk, or to adjust any loss, upon, for or in connection with any consignment of grain so to be carried.

Anyone who counteracts any provision of Sections 6 or 7 of this act, or who fails or neglects to comply with any of the provisions thereof to which he is subject, shall be guilty of an offence and liable therefor to a penalty not exceeding $1,000 and not less than $100, or to imprisonment for a term not exceeding three months, or, if a corporation, shall be liable to a penalty not exceeding $3,000 and not less than $500; and any such offence may be prosecuted and the penalty therefor enforced or recovered either upon indictment or upon some reconviction before any police, stipendiary or other magistrate having jurisdiction of two justices of the peace.

This act is intended to regulate shipping rates of grain transported for interprovincial, foreign or export trade; it shall therefore not apply to grain carried locally to be ground or to be consumed in the province in which the shipment originates, but the burden of proof that any shipment of grain is within the exception shall rest upon the carrier.

In view of this drastic movement it appears to be a question as to whether there can be devised some method of concerted action as respects the handling of lake grain insurance, or else an abandonment of the situation to promiscuous "sharp-shooting" at accounts, with the consequent probability of a general rate war. Those who were party to the old vessel agency combination would, very naturally, like to see something of the sort reinstated; while the outsiders find, in the present mix-up, a fine opportunity to break in and "get theirs." It is suggested that an effective device would be the establishment at Winnipeg of a company that could act as a kind of insurance clearing house through which coverage might be effected for all the assured in one central agency, and thus stabilize rates and conditions. The action of Canada is bound to be felt by American underwriters. If the vessel charterer may no longer pass his charge along to the insurer, it means that insurance rates will now be quoted on a net basis. The question is, what is the net rate to be? Will the net rate, plus the commission, represent much, if any, difference to the underwriter as compared with the 35 percent regularly paid the vessel agents under the old arrangement?

Lake grain is carried in freighters that are the property of the big steel companies. When the movement of ore has largely subsided and grain is demanding shipment, in the fall, it has been customary for the vessel agents to arrange for the chartering of whole fleets from the steel men, which is naturally a much more satisfactory arrangement for the latter than to bother over getting individual grain shipments, here and there, for their idle vessels. The charterers, being in possession of practically all the transportation facilities of the lakes, then dispose of cargo space to shippers, and in lieu of a chartering fee reserve to themselves the placing of the insurance. As has been stated above, they are paid a commission of 35 percent by the underwriters. Out of that commission the charterer pays all handling charges, for loading and unloading, demurrage, etc., etc. The assumption of these charges is a matter of great importance to grain dealers. At Winnipeg, for example, the most active competition exists among dealers, and their quotations not infrequently are so close as to leave a possible profit of scarcely one-eighth of a cent a bushel. What would become of this narrow margin, if an unexpected demurrage charge had to be met? It would certainly mean a loss at Montreal. Thus we find the Canadian dealer already groaning under the new law, and in a frame of mind to welcome some sort of a return to old conditions.

Prove Insurable Interest

JUSTICE FORD, of the Supreme Court of New York County, in a recent decision emphasized the essential importance of establishing insurable interest in merchandize covered under a marine insurance policy, if a plaintiff hopes for recovery.

Action had been brought by Anthony A. Lutfy against the Bankers' and Shippers' on a policy issued to W. Reed Williams, and/or as agent, which the plaintiff contended had been assigned to him together with all claims under it. He then declared that a loss from theft and pilferage had occurred while the cargo was on board the steamer *Charlton Hall* en route from New York to Santiago. Counsel for the insurance company raised the contention that there no longer existed the old legal distinction between the requirements of insurable interest in marine policies and fire policies, and that, in order to recover, a person suing on a policy of marine insurance must allege an insurable interest and establish facts showing such an interest at the time of the loss.

A request was made for such a ruling, the argument being that otherwise marine insurance policies would be subject to condemnation by the statute of the State of New York avoiding wagers and gambling contracts of every sort. Decision was reserved by the court at the time, but Justice Ford has now handed it down, sustaining the contentions of the attorney for the Bankers' and Shippers'.

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Questions and Answers Relating to Naval Architecture and Marine Engineering

Conducted by James L. Bates, Naval Architect, and W. B. Newton, Marine Engineer

This department is maintained for the purpose of answering all questions relating to ships and their machinery. All inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless the editor is given permission to do so.

Barrels of Oil per Knot

Q. (1,214).—What is the average consumption in barrels of oil per nautical mile?

A. (1,214).—It is impossible to answer this question as worded as the power and speed of the vessel enter into the problem.

Assuming the indicated horsepower as 2,200, speed of vessel 12 knots and pounds of fuel oil per indicated horsepower as 1.4, then the fuel consumption per knot would be

$$\frac{2{,}200 \times 1.4}{12 \times 316} = 0.812 \text{ of a barrel.}$$

Average Miles per Barrel of Oil

Q. (1,215).—What are the average miles per barrel of oil?

A. (1,215).—Making the same assumptions as in Q. (1,214) the nautical miles per barrel would be

$$\frac{316 \times 12}{2{,}200 \times 1.4} = 1.23$$

Formula for Block Coefficient

Q. (1,217).—Is there any method of obtaining the displacement and block coefficient of a steamer when no drawings of the hull are available?—C. R. K.

A. (1,217).—The one can not be determined without the other unless drawings are available. Should the displacement be known the block coefficient may be figured, or vice versa, from the formula

$$\text{Block coefficient} = \frac{\text{Displacement} \times 35}{\text{Length} \times \text{Beam} \times \text{Draft}}$$

where length is at waterline and beam is the greatest immersed breadth.

Rate of Depreciation of Steel Ships

Q. (1,219).—I am particularly interested, at present, in obtaining data on the actual rate of deterioration in steel vessels (or other steel structures in which the conditions would be similar) or on what might be termed the "progressive depreciation," i. e., assuming that the percentage, whatever it might be, would not be uniform, but would increase on a sliding scale with the age of the vessel, what should this scale be?

A. (1,219).—As you suggest, the depreciation in ships probably does not progress at a constant rate. However, there are so many contributing causes that it is difficult to establish from actual practice any law that may be considered to apply with even a fair degree of accuracy.

Probably one of the principal causes of depreciation in the value of ships has nothing to do with the deterioration in the material of the hull or with the wear and tear on the machinery. It is the impossibility of keeping ships or their equipment, when they once enter service, strictly up to the latest requirements of that service. For instance, it has been stated that ten years is about the useful life of certain types of cargo carriers on the Great Lakes due to the constant progress made in loading and handling appliances and in the size and speed of the vessels used in this service. Of course, these vessels are not worn out at the end of so short a period but they are obsolescent, if not actually obsolete, at the end of this period. In a similar manner, high class Atlantic passenger vessels are continually being transferred from this to other services less exacting as new devices contributing to luxury, comfort, safety or economy are from time to time introduced rendering vessels not so equipped obsolete by that much.

If the question of obsolescence be ignored, we are not much better off unless it is possible to examine in detail carefully kept cost sheets for a large number of vessels over a long period of years. The repairs made and paid for from time to time are often contingent upon the conditions of the service or business or upon the urgency of the repairs themselves. It results that a vast amount of research is necessary in order to discover any general trend. The following figures for two large sea-going tugs will serve to illustrate this point. These figures cover costs under the head of wear and maintenance for hull only.

Years elapsed since entry upon service	Cost—Wear and Maintenance Tug No. 1	Tug No. 2
1	$514	$947
2	1,673	578
3	7,448	2,869
4	3,433	3,367
5	3,133	5,018
6	9,421	7,924
7	106	13
8	789	9,205
9	13,664	8,077
10	7,684	8,520
11	489	3,847
Total for 11 years.....	$48,354	$50,365

Approximately the same amount was spent on each of the two vessels. In each case the amount expended during the last five years was greater than that expended during the first five years. If, however, these costs be plotted upon a time base, they do not indicate with any certainty a law governing expenditures for a given time in service.

The following figures taken from a paper by John Hick read in 1907 before the North East Coast Institute of Engineers and Shipbuilders are of interest:

Of 28 steel boilers removed from ships—

6 had been in service 8 to 12 years and were removed because of overheating.

3 had been in service 8 to 14 years and were removed because of corrosion.

4 had been in service 13 years and were removed because of corrosion of combustion back or uptakes.

2 had been in service 23 years and were removed because of front tube plate corrosion.

2 had been in service 7 years and were removed because of chamber stays corrosion.

6 had been in service 16 to 20 years and were removed because of wastage of boiler shell.

5 had been in service 25 years and were removed to fit new boilers.

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In the same paper three instances of deck plating removal after 13 years' service due to corrosion are given.

It is understood that the regular British practice is to set aside annually for depreciation at the rate of 5 percent of a vessel's first cost. Thus funds become available for replacement after about 20 years of service.

LETTER TO THE EDITOR

The Diesel and the Future

To the Editor:

Professor Chapman has shown some very interesting figures in the pages of this magazine, particularly in connection with the operating costs of Diesel vessels. These figures are so complete and have been so well worked out that they may safely be taken as a guide for shipowners to follow in considering the question of Diesels versus steam. In general terms, it is brought out that the saving in fuel in the Diesel is practically offset by the capital charges, in the cases of new tonnage.

There are certain factors, however, which should be carefully considered by shipowners in shaping their policies for the future, and I fully believe that the Diesel question should be closely analysed, both as to its present and its future. It is not enough for us to say that from the present viewpoint the decision is a toss-up. We know what it will cost us today to build two similar ships, one steam and one Diesel, and we know that the operating expenses will be about the same, including capital charges. This condition, however, may be altered in a day by the cost of steel, the cost of labor, the price of oil, the world freight market and countless changes in operating conditions. We might favor the steam plant this year and the Diesel next, purely from the standpoint of dollars and cents.

Personally, the writer has unlimited enthusiasm for the Diesel, believes in its theory and merit, and fully expects the Diesel to supplant steam, nor is this any new idea with him. But this enthusiasm has been kept in check because the balance sheet does not as yet entirely prove that the Diesel is to supplant the steam. Of course, from an engineering viewpoint, the Diesel is almost a thing of beauty. Here is a machine which burns its own fuel and has no losses other than those contained within the engine itself. No transfer of heat from oil to water through boiler steel, no British thermal units going to waste in the stack and atmosphere, no long steam leads from boilers to engines. This Diesel engine per horsepower saves two-thirds of the fuel and with it all is efficient and reliable. These points do not have to be proved to engineers. The only question is, will we be able to take advantage of this saving and run our ships at greater profit than with steam? The answer is somewhat uncertain.

In the first place, however, let us turn back to the advent of steam over sail, when our clippers were running rings around everything on the high seas. We were masters of the whole situation in those days, and the world acknowledged us as such. We had cheap materials, efficient shipbuilders, shrewd shipowners and dauntless seamen. We had the world beaten at one of its oldest games. Even after our competitors copied our designs, we still outsailed them, and they were forced to find some new method or acknowledge defeat.

They found their new method in utilizing steam instead of winds, and when they adopted it, our own people, believing that they were securely seated at the top of the world, looked on with a feeling of indifference. We considered steam—and turned it down with what is now clear evidence of lack of foresight. Our ships disappeared slowly from the sea, from which they have continued to be conspicuous by their absence.

The present day value to us, of this tremendous mistake of the past, should cause us to look into the Diesel question so clearly that we cannot go wrong. Nor is it a question for engineers only, it is the real live issue today which should be right before the board of directors, whose decision should not be based on today but upon the probable events of the next twenty years. Clear vision and clear thinking are required.

Secondly, what information can we gain from developments in Europe? The British, Danes and Norwegians, whose present maritime prestige need not be discussed, are going into Diesels in no half-hearted way. Look over any shipping publication and you find a new motorship proposed, laid down or launched, and even a double acting Burmeister & Wain is being built after successful experiments have proved its worth. Hardened Scotch engineers, masters of the steam job, are looking with favor on the new engine, and who could be more difficult to convince? Motorships have arrived on the other side of the Atlantic for permanent service and the European engineers are pretty clear thinking people. They would not now be building motorships, if they had not looked clearly into the economic possibilities involved, just as they saw what steam would do almost a century ago.

In the third place (and this seems the meat of the whole proposition), what is the future of the oil supply? If the writer recalls correctly, the geologists have set some sort of a definite limit to the oil supply of the world, yet fortunately for us, every now and then some new oil field develops which gives us a little more oil in sight. We will hope that new fields will always be coming through the earth's crust in order that the world may continue to benefit by this wonderful fluid fuel. Still, the oil supply is not nearly so well guaranteed as the coal, but regardless of the limit to the future supply, how are we to account to posterity for the millions of tons which are wasted annually in steam plants of all kinds?

If there were only two hundred oil burner steamers in the world today, and each of these vessels burned seven thousand tons a year, the preventable loss of energy amounts to more than one million tons of fuel oil, for this is approximately what would be saved, if the two hundred ships were Diesel engined. The same cargoes could be carried, the same speed would be maintained, and ten million dollars would be saved on the fuel bill. Furthermore, if every oil burning freighter in the world today were converted to Diesel, and thus materially cut into the demand for oil, the price would go down and a further saving to the shipowner would result. Going further into the conservation of energy involved, it would be a positive national asset, if we could cut down the rate at which we are now burning oil, exhausting nature's bounty just because it happens to flow.

The day may not be far off when certain legislative restriction will be placed on the use of oil; we may also witness the day of our own oil supply running so low that we will have to import for our own uses, at which time we may be forced to choose between coal and Diesels. These and other conjectures ought to have our closest attention, and no decisions made without full possession of all the facts. This problem is none too small for the best minds among our financiers, engineers, geologists and statesmen, and even we lay-people, whose ordinary function is to "carry on," ought to contribute our thoughts and ideas.

In conclusion, and in reiteration, the writer believes that the Diesel is not only holding its own, but will make immense strides in the future. The signs point to an age of oil-engined propulsion, certainly for cargo carriers, probably for passenger vessels. Will we accept our opportunity or refuse it?

New York. K. H. Donavin,
Assistant Manager, Operating Department
International Mercantile Marine Company

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PERSONAL MENTION

C. P. KRAMER is acting secretary of the United States Shipping Board.

SIR JOHN BILES, the eminent British naval architect, was a visitor in New York last month.

HARRY ANNING, formerly Portland manager for Sudden and Christenson, has joined the staff of Norton Lilly and Company.

FRED CHASE, for seventeen years with the Admiral Line, has been appointed general agent for Struthers and Barry at Los Angeles, Cal.

THEODORE H. JACOBS is in charge of the Pacific coast passenger office of the United American Lines at 230 California street, San Francisco.

KIRKWOOD H. DONAVIN, formerly assistant to the manager of operations at the International Mercantile Marine Company's Chelsea Piers, New York, has been appointed resident representative at San Francisco of the operation department of the Panama-Pacific Lines. Born in Ohio in 1886, Mr. Donavin was educated for American naval service and graduated from the Naval Academy in Annapolis in 1908. For five years he was on naval duty in Pacific waters and for a year he was stationed in the Far East. He also spent five years in submarine service. In 1920 he was on the staff of Admiral Hilary P. Jones, now commander of the fleet. Upon leaving the Navy in 1920, Mr. Donavin joined the shore staff of the International Mercantile Marine Company, New York.

K. H. Donavin

CLIFFORD SMITH, formerly secretary of the United States Shipping Board, has become assistant to the managing director of the Board for Brazil.

A. P. ALLEN, formerly sales manager of the Federal Shipbuilding Company, Kearny, N. J., has become associated with Pacific coast lumber interests.

GORDON P. WHITE, one of the directors of the Baltimore Chamber of Commerce, has become a partner in the firm of Adams and Company, steamship agents and brokers of Baltimore.

A. T. B. SHIELS, former American Bureau of Shipping surveyor, has opened an office for general practice as marine surveyor and consulting engineer at 412 Bay Building, 1213 First avenue, Seattle, Wash.

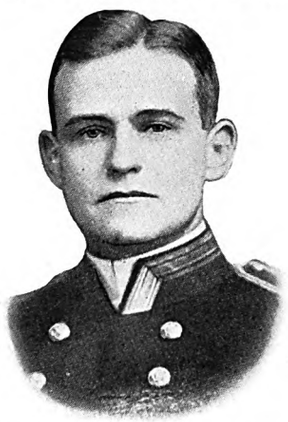
EDWARD P. FARLEY, chairman of the Shipping Board, has been elected president of the Emergency Fleet Corporation. At the same time the scope of the duties of Vice-President Sidney Henry have been broadened to include, in addition to the general supervision of the Department of Sales and Finance, the administrative department, statistical department, the personnel division, the department of investigation and the field forces.

JOHN F. LAMCKE, formerly port engineer for the Shipping Board during the war; assistant superintending engineer for the Cosmopolitan Steamship Company, Port of New York; superintendent engineer of the Green Star Steamship Company at Baltimore and consulting engineer and marine surveyor at Baltimore, has joined the Maintenance and Repair Department of the United States Shipping Board, 45 Broadway, New York.

CAPTAIN REGINALD ROWEN BELKNAP, U. S. N., commanding officer of the new battleship *Colorado*, commissioned last month at the yards of the New York Shipbuilding Corporation, Camden, N. J., entered the Naval Academy in 1887. He served in the Spanish war, the Philippine insurrection and the Boxer campaign and in 1909 was decorated for service in connection with the Messina earthquake relief. From 1915 to 1917 he was commander of the mine laying and mine sweeping branch of the Atlantic fleet and in May, 1917, he was promoted to the rank of captain. Captain Belknap was awarded the Navy Distinguished Service medal for service in connection with fitting out and afterwards commanding the American mine laying squadron in the northern mine barrage operation in the North Sea. From 1919 to 1920 he was in command of the battleship *Delaware* and more recently was on the staff of the Naval War College.

Captain R. R. Belknap, U. S. N.

LIEUTENANT-COMMANDER F. T. LEIGHTON, U. S. N., has been appointed engineering officer of the battleship *Colorado* and assumed his duties with the commissioning of this new vessel at Camden, N. J., last month. Lieutenant - Commander Leighton was appointed to the Naval Academy at Annapolis from Pennsylvania in 1905. After his graduation from the Naval Academy and subsequent service at sea Lieutenant-Commander Leighton entered the Post-Graduate Engineering School from which he was graduated in 1917. During the World War he served as executive and repair officer of the United States submarine tender *Savannah;* later he was assigned to special duty abroad and was stationed in London.



Lt.-Commander F. T. Leighton, U. S. N.

Biography of Sir William White

Messrs. E. P. Dutton & Company, 681 Fifth Avenue, New York City, will shortly publish an American Edition of the "Life of Sir William White." This biography covers the whole period of naval construction from the beginning of steam propulsion and the building of iron ships to the opening of the *Dreadnought* era and the fitting of the *Mauretania* with turbines. It thus covers the most important period in the development of naval architecture and marine engineering and becomes a valuable work of reference.

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The Month's Shipping and Shipbuilding News in Brief

Shipyard, Steamship and Port Activities and Other Notes of Interest in All Branches of the Marine Industries

Chief Engineers of Shipping Board Ships Honored for Efficiency

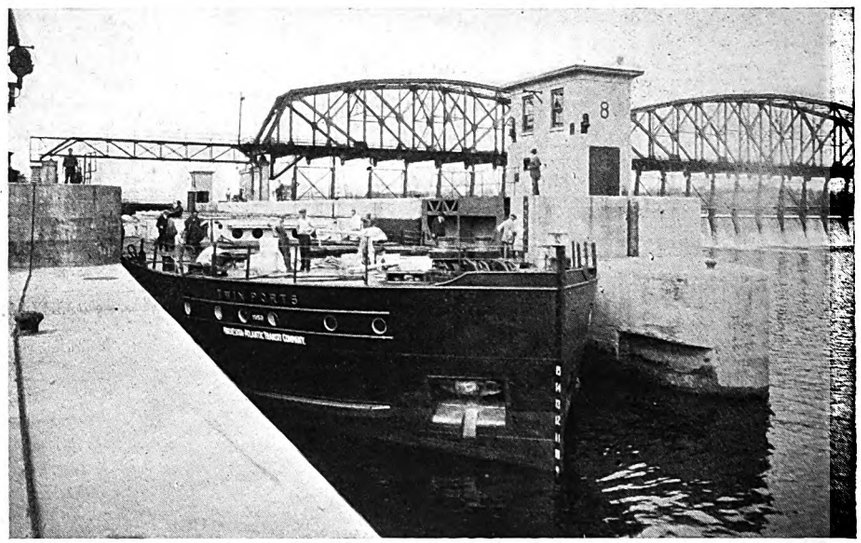
THE Fuel Conservation Committee of the United States Shipping Board, which was organized about a year ago by Joseph E. Sheedy, vice-president of the Emergency Fleet Corporation, has announced the first list of chief engineers who have shown outstanding efficiency in the operation of Shipping Board vessels during the past six months. At this time it is only possible to include in this list the chief engineers operating vessels out of the Port of New York, but in the future the committee will issue quarterly reports that will include other principal ports.

The fuel bill is the largest item of the operating costs, and it is, therefore, the logical place to help reduce the handicap under which American vessels are laboring in their competition with foreign shipping. The amount of fuel that is burned is under the direct control of the chief engineer, and the Fuel Conservation Committee, much to its gratification, has found that the engineers have appreciated its work of determining how much fuel the numerous types of Shipping Board vessels ought to consume, and are giving their hearty cooperation.

There has been a decided improvement all along the line, not only because the engineers have been given a standard to aim at but also because it is only human for a man to do his best when he knows that some one having authority is taking interest in what he accomplishes. The following honor list includes only those who have shown exceptional ability. There are several chiefs who are close to the mark and there will probably be several new names in the next report.

Honor List

Chief Engineer	Vessel	Operator
Adams, C. S.,	*West Cherow,*	Black Diamond S.S. Corp.
Anderson, C.,	*Pres. Garfield,*	U. S. Lines.
Anderson, J.,	*Ala,*	Black Diamond S.S. Corp.
Augustine, L.,	*Stanley,*	Barber S.S. Lines, Inc.
Barr, E. R.,	*Arcturus,*	Kerr S.S. Co., Inc.
Becker, J. S.,	*Independence,*	Barber S.S. Lines, Inc.
Bernson, E. N.,	*Eclipse,*	Barber S.S. Lines, Inc.
Blanchard, W. H.,	*Haleakala,*	International Freighting Corp.
Brennan, P.,	*America,*	U. S. Lines.
Bridges, W. L.,	*Easterner,*	U. S. and Australasia Line.
Brown, Geo.,	*Elkton,*	Barber S.S. Lines, Inc.
Cook, C.,	*Pres. Fillmore,*	U. S. Lines.
Crisp, G. B.,	*McKeesport,*	Cosmopolitan Shipping Co., Inc.
Cuming, C.,	*Endicott,*	Barber S.S. Lines, Inc.
Davison, E. L.,	*Schodack,*	Cosmopolitan Shipping Co., Inc.
Edes, E. N.,	*William Penn,*	Barber S.S. Lines, Inc.
Fleming, A. O.,	*American Legion,*	Munson S.S. Line.
Fletcher, W. A.,	*Ala,*	Black Diamond S.S. Corp.
Goldman, H.,	*West Camak,*	International Freighting Corp.
Hanlon, M. J.,	*Pres. Harding,*	U. S. Lines.
Hodgekiss, W.,	*George Washington,*	U. S. Lines.
Kelly, J. D.,	*The Lambs,*	Kerr S. S. Company, Inc.
Meagher, J.,	*Argosy,*	Wessel Duval & Co.
Nash, N. E.,	*West Nohno;*	Bull, A. H., & Co.
Pancott, A.,	*Waukegan,*	Cosmopolitan Shipping Company, Inc.
Parker, H. C.,	*Eastern Planet,*	U. S. and Australasia Line.
Pierce, C. J.,	*Homestead,*	Kerr S.S. Company, Inc.
Rakow, J. W.,	*Pres. Arthur,*	U. S. Lines.
Ramm, P. F.,	*West Cherow,*	Black Diamond S.S. Corp.
Richardson, J. L.,	*Pan America,*	Munson S.S. Line.
Robbins, E. S.,	*Pres. Roosevelt,*	U. S. Lines.
Stuart, R. M.,	*Southern Cross,*	Munson S.S. Line.
Styron, A. W.,	*Pres. Van Buren,*	U. S. Lines.
Swatridge, W.,	*Pres. Polk,*	U. S. Lines.
Thompson, G.,	*Scottsburg,*	Barber S.S. Lines, Inc.
Thompson, T.,	*Archer,*	Barber S.S. Lines, Inc.
Thomson, J. W.,	*Western World,*	Munson S.S. Line.
Thorsky, M.,	*Vincent,*	Cosmopolitan Shipping Company, Inc.
Trent, T.,	*Conejos;*	Bull, A. H., & Co.
Turpin, J. E.,	*Nile,*	Kerr S.S. Company, Inc.
Winlaw, T.,	*Eastern Moon,*	U. S. and Australasia Line.
Yandell, F.,	*Pres. Adams,*	U. S. Lines.
Ziegenfuss, C. B.,	*Wekika;*	Winchester, J. H., & Co., Inc.



Motorship Twin Ports Passing Through Locks Near Amsterdam, N. Y., on Maiden Voyage Through New York State Barge Canal

First Diesel Electric Motorship from the Lakes Makes Maiden Trip Through New York State Barge Canal

MANEUVERING with the utmost ease and handling like an old and tried vessel, the Diesel electrically propelled Great Lakes and canal motorship *Twin Ports,* of the Minnesota Atlantic Transit Company completed her maiden voyage between Ashtabula and New York, docking at the latter port on September 20. She carried a bulk cargo of rye and was accompanied through the New York State Barge Canal by a party of engineers and shipping men.

The first trip of the *Twin Ports* followed immediately upon the official trials held at Ashtabula, which came up to and exceeded every expectation of her designers and builders. The voyage through the Welland Canal, down the Erie Canal and through the Hudson waterway was made without a hitch. A. Miller MacDougall, president of the Atlantic Transit Company, declared the Diesel electric propulsion to be unsurpassed for this class of service and was high in his praise of the vessel's performance.

The *Twin Ports* is a steel electrically-driven motorship, designed by Henry Penton, of Cleveland, Ohio, and constructed by the Great Lakes Engineering Works, Detroit, Mich., at their Ashtabula, Ohio, plant. The electrical propelling machinery was supplied by the General Electric Company, Schenectady, N. Y.

The principal dimensions are as follows:

Length overall	258 feet
Beam	42 feet
Depth	18 feet
Draft	10 feet
Speed	10 miles
Cargo capacity	2,600 tons
Refrigerated cargo	600 tons

Propelling Machinery

The propelling machinery consists of two 375 horsepower, 6-cylinder, 4-cycle Diesel engines, built by the Lombard Governor Company, of Ashland, Mass. Each engine is directly connected to a 250-kilowatt generator and operates at a speed of 260 revolutions per minute.

These two main generators work on one bus bar, so that the two propelling motors are assured of an equal distribution of

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power. The current from this bar is supplied to the two propelling motors which are of 250 horsepower. All the motors are operated at a normal speed of 180 revolutions per minute.

Novel Features

An unusual feature of the machinery installation is the fact that both main engines are installed with the axis of their crankshafts athwartships instead of longitudinal. Another innovation is the control of these engines which is entirely in the hands of the captain in the pilot house. The engineer on watch has no knowledge of what the captain may be doing. He can, however, note the amount of power being used at any time by looking at the switchboard. In this way the time of announcing the captain's orders to the engine room is saved.

These engines differ from most Diesel designs in that the valve gears which run right across the top of the engines and the piping all stay in place when the pistons are removed. The pistons, as will be surmised, are removed from the bottoms of the engines.

Each engine carries its own air compressor, delivering injection air at about 850 to 900 pounds per square inch. The compressors are directly connected to the main engine and are of the three-stage type. The forced lubricating oil system is also directly driven by means of gears from the main engine.

Auxiliary Engine

There is also installed an auxiliary engine of 60 horsepower which runs at 360 revolutions per minute and which is directly connected to a 40-kilowatt generator. This auxiliary engine, however, is not connected for driving the auxiliaries when the vessel is at sea. This is done by the main engine when under way. The auxiliary power is for port service only, except in the case of emergency.

Auxiliary Machinery

All the auxiliary machinery is driven by motors. In the engine room there is one water circulating pump of the centrifugal type of 7½ horsepower; one general service pump of 20 horsepower of the plunger type which may also be used as a standby as a circulator; one rotary balance pump of 10 horsepower; one lubricating oil pump of the plunger type which is a standby in case the pump directly connected to the engine fails; one fuel oil transfer pump of the plunger type of 3 horsepower; one emergency compressor of the Winton type of 6½ horsepower, and one emergency 5-kilowatt kerosene Winton set.

Deck Machinery

All deck machinery is electrically driven, including the steering gear and windlass.

The heating is all electric throughout the ship. Maxim silencers for the exhaust gases furnish hot water for the daily supply tanks and for heating the fuel oil in the double bottom.

Trial Trip

On the trial trip, which was held between Ashtabula and Cleveland, a speed of 9.6 miles was obtained, but in deep water, while running down the Hudson river, the vessel made over 10 miles.

Mr. H. Schreck, chief engineer of the Lombard Governor Company, was highly gratified by the performance of the vessel and phophesies that many more of her type will be constructed for the canal in the near future. In the winter months the *Twin Ports* is scheduled to operate in the coastal service between New York, southern ports and the West Indies, carrying refrigerated and other perishable cargoes.

Penn Bridge Company Offers Lowest Price for Construction of Six Steel Barges for Government

At the opening of tenders by the United States Engineer Office, of Montgomery, Ala., on September 10, for three steel barges 80 feet by 26 feet by 5 feet, and three barges 60 feet by 22 feet by 4 feet, the Penn Bridge Company, of Beaver Falls, Pa., was low bidder. The prices submitted were as follows:

Name and Address	Amount	Delivery, Days	Barges. Number	Size
Penn Bridge Co., Beaver Falls, Pa.....	$72,850.00	250	Six	Three 80'x26'x5' Three 60'x22'x4'
Nashville Bridge Co., Nashville, Tenn..	15,485.00	150	One	80'x26'x4'
	31,990.00	170	Two	80'x26'x4'
	46,925.00	190	Three	80'x26'x4'
	27,480.00	190	Three	60'x22'x4'
	73,900.00	240	Six	As above
Charleston Dry Dock & Machine Co., Charleston, S. C.....	16,336.00	240	One	80'x26'x5'
	31,672.00	240	Two	80'x26'x5'
	48,008.00	240	Three	80'x26'x5'
	28,692.00	180	Three	60'x22'x4'
	76,700.00	240	Six	As above
Bethlehem Shipbuilding Corporation, Ltd., 25 Broadway, New York, N. Y.*.....	52,225.00	185	Three	80'x26'x5'
	32,525.00	185	Three	60'x22'x4'
The Dravo Co., Diamond Bank Bldg., Pittsburgh, Pa.	52,500.00	195	Three	80'x26'x5' 60'x22'x4'
	33,150.00	180	Three	As above
	85,650.00	195	Six	Three 80'x26'x5'
Midland Bridge Co., Midland, Pa.....	86,000.00	300	Six	Three 60'x22'x4'

*If awarded, 6 barges take 235 days to deliver.

198 Steel Vessels of 164,236 Gross Tons Under Construction or Contract for Private Ownership on August 1

On August 1, 1923, American shipyards were building or under contract to build for private shipowners 198 steel vessels of 164,236 gross tons, compared with 203 steel vessels of 172,301 gross tons on July 1, 1923.

There were 8 wood vessels of 1,004 gross tons building or under contract to build for private shipowners during the same period, compared with 5 wood vessels of 1,004 gross tons on July 1, 1923. These figures do not include government ships or ships building or contracted for by the United States Shipping Board.

Following is a summary of reports of shipyards to the Bureau of Navigation, Department of Commerce, showing the number and gross tonnage of steel and wood vessels of 100 gross tons and over under construction or contract for private owners on August 1, 1923:

Companies	Steel		Wood	
	Number	Gross tonnage	Number	Gross Tonnage
American Bridge Co., Ambridge, Pa.....	106	50,100	..	....
American Shipbuilding Co., Cleveland, Ohio.....	5	34,784	..	....
Arthur D. Storey, Essex, Mass.....	...	.....	1	140
B. H. Elliot (Inc.), Houston, Tex.....	...	.....	1	100
Bethlehem Shipbuilding Corporation (Ltd.):				
Baltimore Dry Docks Plant, Baltimore, Md.....	1	920	..	....
Harlan plant, Wilmington, Del.....	2	792	..	....
Sparrows Point plant, Sparrows Point, Md.....	3	13,600	1	500
Booz Brothers, Baltimore, Md.....	...	.....	1	144
Charles Ward Engineering Works, Charleston, W. Va.....	4	1,030	..	....
Craig Shipbuilding Co., Long Beach, Calif.....	2	760	..	....
Dravo Contracting Co., Pittsburgh, Pa.....	17	6,895	..	....
Federal Shipbuilding Co., Newark, N. J.....	2	2,495	..	....
Geo. Lawley & Son Corporation, Neponset, Mass.....	2	550	..	....
Great Lakes Engineering Works, Ashtabula, Ohio.....	2	3,200	..	....
Howard Shipyards Co., Jeffersonville, Ind.....	2	995	..	....
Ira S. Bushey & Sons (Inc.), Brooklyn, N. Y.....	...	.....	3	....
James Rees & Sons Co., Pittsburgh, Pa.....	1	175	..	....
John H. Mathis Co., Camden, N. J.....	1	450	..	....
Johnson Iron Works, Dry Dock & Shipbuilding Co., New Orleans, La.....	1	250	..	....
Los Angeles Shipbuilding & Dry Dock Corporation, Los Angeles, Calif.....	3	712	..	....
Marietta Manufacturing Co., Point Pleasant, W. Va.....	10	3,279	..	....
Nashville Bridge Co., Nashville, Tenn.....	4	1,060	..	....
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.....	2	7,750	..	....
New York Shipbuilding Corporation, Camden, N. J.....	13	16,715	..	....
Pusey & Jones Co., Wilmington, Del.....	2	1,270	..	....
Staten Island Shipbuilding Co., Mariners Harbor, N. Y....	5	1,200	..	....
Sturgeon Bay Dry Dock Co., Sturgeon Bay, Wis.....	1	1,000	..	....
Sun Shipbuilding Co., Chester, Pa.....	4	1,119	..	....
Todd Dry Dock & Construction Corporation, Brooklyn, N. Y.	1	225	..	....
Toledo Shipbuilding Co., Toledo, Ohio.....	2	13,000	..	....
Vinyard Shipbuilding Co., Milford, Del.....	...	.....	1	120
Total	198	164,236	8	1,004

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Two Ferries and Two Barges to Be Built in Connection With New Orleans Terminal Service and Development

THE Algiers Public Service Company, Inc., of New Orleans (Algiers), La., is having plans and specifications prepared for the building of two new catamaran type ferries for service from New Orleans to Algiers, across the Mississippi River. The vessels are to replace the present steamers of similar type, which are to be used at Barracks and Olivier streets after being considerably altered and given a general overhauling.

The proposed new boats are to have a length of 150 feet, beam 65 feet, and will burn oil for fuel. They will be fitted to carry passengers on the upper decks and vehicles on the lower deck and will be in general larger and more modern than their predecessors.

TWO BARGES PLANNED

The same company has issued plans and specifications for two pontoon barges 90 feet long, having a beam of 30 feet and seven feet deep, bids for which were received last month. The vessels are also for use at Barracks and Olivier streets, which terminal is to be a complete new installation on both sides of the river. It will comprise ferry houses, bridges, pontoons, piling supports, hoisting devices, etc.

The Canal street terminals, where the new ferries will be used, will also be a new development, with pontoons, bridges, piling, ferry houses, hoisting devices, etc. The Algiers Public Service Company is building or taking care of the Algiers side of the improvements and the Dock Board is building the New Orleans terminal in conjunction with beautification plans for the head of Canal street. Modern equipment will be used throughout the development.

Contract for Reconditioning U. S. Seagoing Dredge Atlantic Awarded to Morse Dry Dock & Repair Company

THE contract for extensive repairs and reconditioning work on the U. S. seagoing dredge *Atlantic*, has been awarded the Morse Dry Dock & Repair Company of Brooklyn, N. Y., following the opening of bids by the United States Engineer Office, 39 Whitehall Street, New York, on September 12. The specifications provided for a large amount of various work on the hull and extensive repairs to the engines and the auxiliary machinery. The installation of oil tanks and oil burning equipment with the necessary heaters, pumps, etc., was also provided for. The bids submitted were as follows:

	For all work except Par. 24, 71 and 72.	Work under Par. 67.	Work under Par. 71 and 72.	Time for work except Par. 71 and 72.	Time for work except Par. 67.	Per cu. yd. for removing mud.	Per lb. for old castings.
Morse	$41,000	$3,110	$35,115	20 days	35 days	$3.50	.0025
Robins	45,850	2,900	32,900	40 days	40 days	3.50	.005
Tietjen & Lang	47,774	3,010	34,845	42 days	42 days	3.50	.005
W. & A. Fletcher	53,600	4,500	38,500	33 days	45 days	3.25	.003
Staten Island Shipbuilding Co.	53,990	3,470	46,790	30 days	40 days	3.50	.0075
Federal	55,000	5,000	48,000	35 days	48 days	3.25	.004
Bethlehem	81,800	8,700	65,000	100 days	140 days	2.00	.005

Paragraphs 24 dealt with the removal of material in the bins after the dredge was docked; 67 with boilers, fire room and bunker work, material to be furnished by contractor; 71 with the building of two oil tanks, one on each side of the dredge, and 72 with the furnishing and installation of an oil burning equipment.

Reconditioning of Five Army Transports to Replace "502's" Is Planned By Shipping Board

THE conversion and reconditioning of five army transports for the replacement of the "502" ships recently sold by the government to the Dollar Line is under consideration by the Shipping Board. It is understood that preliminary plans are being prepared for the preparation of five of the Hog Island type "B" ships, laid up in the James River, for service as freight steamers on the London route for the United States Lines.

It is believed that the reconditioning work will include the addition of refrigerator spaces for cargo, a general rearrangement of the ships and the possibility of later fitting them to carry a limited number of passengers. The ships are 448 feet long, equipped with geared turbines and reduction gears.

Although official figures were not obtainable, it is thought that the work to be done will involve an expenditure close to $100,000 for each ship.

Seven "502" Ships Sold by Board to the Dollar Line

CHAIRMAN EDWARD P. FARLEY, of the United States Shipping Board, has announced the sale of seven combination freight and passenger ships, known as the 502 type, to the Dollar Line, whose home office is the Dollar Building, San Francisco. These vessels, the *Presidents Garfield, Monroe, Adams, Van Buren, Polk, Hayes* and *Harrison,* will be operated in an around-the-world service, starting at San Francisco and touching Japan, China, Philippines, Java, Straits Settlements, Singapore, India, through the Suez, Egypt, Mediterranean ports to New York, thence through the Panama Canal to home. By arrangement with the Board, this service is guaranteed for five years. This will be the first round-the-world service of this kind that has been inaugurated, for while the Dollar Company is maintaining freight boats on this service, there are no other ships now in a continuous service around the world under any flag.

The Shipping Board is of the belief that this service will be of great value to American travelers and merchants, and it will have the full support of the Board in its effort to build up an American merchant marine.

These ships were built by the New York Shipbuilding Company and are of 10,533 gross tons register and 6,195 tons net.

Contract for New Steamer Awarded to Midland Barge Co.

THE Midland Barge Company, Midland, Pa., has received a contract from the Louisville-Cincinnati Packet Company for the construction of a steel hull, side wheel five deck passenger and packet steamer. The vessel is to have an overall length of 291 feet 6 inches; beam molded, 45 feet 6 inches; beam over guards, 83 feet; depth molded, 7 feet 6 inches.

Engines are to be tandem compound, to be built by the Charles Barnes Engine Company, Cincinnati, Ohio, and steam is to be supplied by five boilers to be built by the Acme Boiler Company, Gallipolis, Ohio.

Annual Convention of Atlantic Waterways Association Nov. 13-16

"Get the American waterways in shape for work" will be the motto this year of the Atlantic Deeper Waterways Association, which will hold its sixteenth annual convention in Norfolk, Va., November 13-16, according to Mayor J. Hampton Moore, of Philadelphia, president of the organization, who has issued a call for a big attendance of business delegates.

He urged a representative attendance from the ports and sections whose commercial welfare will be affected by development.

Removal Notice

R. E. Lovekin Corporation will occupy the sixth floor of the Smith Building at the southeast corner of 18th and Market Streets, Philadelphia, Pa., after October 1, 1923.

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Norfolk Ready to Pay $3,500,000 for Army Supply Base

NORFOLK, Va., (Special)—The city of Norfolk has agreed to pay $3,500,000 for the Army Supply Base here, exclusive of the two piers, on condition that it shall be allowed to lease the piers while the government desires to retain title to them and that it shall be permitted to purchase them for $1,500,000 when the government no longer has need of them. The City has operated the Army Base facilities under lease as a municipal terminal, for about four years.

The papers covering the transaction, prepared at a series of conferences between city officials, their counsel, Col. Jennings C. Wise, and members of the Shipping Board, and their attorney, John Nicholson, are ready for signatures.

Though the city desired to purchase both the piers and the shore property, which includes long rows of fireproof warehouses, miscellaneous buildings and fifty miles of tracks, offering the War Department $5,000,000 for the whole of the property, the plan which has been worked out in the opinion of members of the port commission, is almost as advantageous to the municipality.

The value of the warehouses and railroad yards at the army base is directly dependent upon whether the owner of this property has ownership, or the right to use the two piers. Therefore, the contract for the transfer of the property has been drawn with a view to the protection of the city's interests. It is understood that the city is to receive title to the property on shore as soon as it signs the deed and that another deed, transferring the piers to the city when the government is willing to relinquish them, will be placed in escrow.

The government retains no waterfront, except that occupied by the two piers, and a strip on either side of them the width of half a slip.

Scholarships Awarded by Lloyd's American Committee

THE quarterly meeting of the American committee of Lloyd's Register of Shipping, held in New York on September 5, was marked by the introduction to the committee of the first four successful candidates to be awarded the scholarships in naval architecture and marine engineering given by the committee.

These scholarships were established in the early part of 1922, one being allotted to the Massachusetts Institute of Technology, Cambridge, Mass., and one to the University of Michigan, Ann Arbor, Mich. Each scholarship has a value of $500 per annum and is tenable for three years, subject to the satisfactory annual progress of the student.

The first two scholarships were awarded in July, 1922, to students of the freshman classes of the above universities, Warner Lumbard, of Dorchester, Mass., being awarded the scholarship at the Massachusetts Institute of Technology, and Christopher E. Blaydon of Detroit, Mich., that at the University of Michigan.

This year the committee has awarded the University of Michigan scholarship to Mark L. Ireland, Jr., of East Lansing, Mich., and the Massachusetts Institute of Technology scholarship to R. W. Rogers of Chicago, Ill.

These four gentlemen were presented to the American committee of Lloyd's Register of Shipping by Alfred Gilbert Smith, chairman of the society, and president of the New York & Cuba Mail Steamship Company. They were afterwards entertained at luncheon at the Whitehall Club. During the afternoon they visited the White Star Liner *Olympic* and on the following day were shown around the city of New York.

American Bridge Company Submits Lowest Proposal for Construction of 19 Steel Barges for Government

THE American Bridge Company, Pittsburgh, Pa., with a price of $54,000 for four barges without cargo boxes and $215,250 for fifteen barges with cargo boxes, submitted the lowest price for the construction and delivery of nineteen of the boats at the opening of tenders by the United States Engineer Office, Louisville, Ky., on September 11. The proposed vessels are to have a length of 110 feet; beam, 26 feet; depth 6½ feet.

The prices submitted, upon which no decision has been announced as yet, are as follows:

	No. 1, American Bridge Co., Pittsburgh, Pa.	No. 2, Nashville Bridge Co., Nashville, Tenn.	No. 3, Dravo Contracting Co., Pittsburgh, Pa.	No. 4, Chas. Hegewald Co., New Albany, Ind.	No. 5, Howard Shipyard & Dock Co., Jeffersonville, Ind.	No. 6, Midland Barge Co., Midland, Pa.	No. 7, Penn Bridge Co., Beaver Falls, Pa.	No. 8, Riter-Conley Co., Pittsburgh, Pa.
Regular Proposal—								
4 Steel barges, lump sum.	$54,000	$96,160	$72,800	.....	.....	$80,000	$76,240	$61,120
15 Steel barges, lump sum.	215,250	387,600	287,250	.....	.....	318,000	302,830	243,450
Alternate Proposal No. 1—								
15 Steel barges, lump sum.	215,250	390,600	287,250	.....	.....	318,000	317,830	243,750
Alternate Proposal No. 2—								
4 Steel barges, lump sum.	54,000	96,960	72,800	.....	.....	80,000	.....	61,200
10 Steel barges, lump sum.	143,500	260,400	191,500	.....	.....	212,000	.....	162,500
Alternate Proposal No. 3—								
10 Steel barges, lump sum.	143,500	264,400	194,000	.....	.....	212,000	.....	163,700
Alternate Proposal No. 4—								
4 Steel barges, lump sum.	.....	98,960	74,320	.....	.....	80,000	.....	63,720
5 Steel barges, lump sum.	.....	132,700	97,800	.....	.....	107,000	.....	84,600
Alternate Proposal No. 5—								
5 Steel barges, lump sum.	.....	136,200	100,000	.....	.....	.....	.....	91,650
Alternate Proposal No. 6—								
4 Steel barges, lump sum. *	.....	103,700	76,880	69,990	71,670	.....	83,300	71,720

*If barges are delivered afloat at Ambridge, Pa., sum of $350 per barge will be deducted from above price.

Todd Yard is Low Bidder for 6-Barge Construction Job

THE Tacoma plant of the Todd Shipbuilding Corporation, submitted the lowest bid for the construction of six steel barges at the opening of proposals by the United States Engineer Office, Portland, Ore., on September 7. The Todd figure was $114,900.

The proposed boats are to have a length of 120 feet, 34 feet beam and a depth of 7 feet 6 inches, delivery to be at Linton, Ore. The tenders were:

Todd (Tacoma)	$114,900
Smith & Watson Iron Works	155,700
Albina Marine Iron Works	179,850
Seattle Boiler Works	180,000
Penn Bridge Company	181,200
W. B. Kyle	193,200
Bethlehem S. B. Corporation	297,710

Ford to Build Million Dollar Plant With Docks

It is reported from Louisville, Ky., that Mr. J. L. McPhee, manager of the Louisville Ford Company's assembly plant, has announced that the Ford Company will build a new $1,000,000 assembly plant on the Ohio River in the suburbs of Louisville. Docks and terminal facilities at this plant will be erected as the Ford Motor Company plans to use the river to a large extent in its shipments.

Bids Received for Six Derricks at Louisville, Ky.

THE United States Engineer office, Louisville, Ky., received sealed proposals until 2 P. M., central time, September 29, for furnishing and delivering two to six steel derrick boat hulls. The derricks are to include all sheaves, pins, collars, clevises, rollers, boom sheaves, blocks, etc., but not wire rope. The booms are to have a length of 65 feet and the bull wheels will have a diameter of 16 feet.

The proposed hulls are to have a length between perpendiculars of 74 feet 8 inches; beam 34 feet 8 inches; depth at gunwale 5 feet. Delivery is to be made at U. S. Siding, Louisville and Portland Canal, Louisville, Ky. It is estimated that the boats will cost about $5,000 each.

Proposals Open October 1 for Marine Boiler, Stack and Fixtures

Sealed proposals will be received until 11 A. M., October 1, by the United States Engineer Office, Montgomery, Ala., for furnishing one steam boiler, with fixtures, stack, etc., for the U. S. Dredge *Upatoi,* at Columbus, Ga.

The boiler is to be of the Scotch marine, water-back type, designed for a working pressure of 200 pounds, to have not less than 1,200 square feet of effective heating surface and not less than 37 square feet of grate area. The furnace is to be of the Morrison suspension type. The stack to be furnished is to be of suitable diameter, 35 feet in length and supplied in two sections. It is to be built of 14-gage steel.

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Shipping Board Owns 1,334 Ships Valued at $226,733,315; Only 416 Are in Operation or Ready for Delivery

CHAIRMAN EDWARD P. FARLEY, of the Shipping Board, has made public the figures on the merchant fleet owned by the Board showing the number and kind of ships composing the Government fleet, together with their valuation.

The statement, as of September 8, 1923, shows that the Board owns 1,334 ships, the total value of which is $226,733,315. Of these ships 416 are in operation or ready for spot delivery, with 882 laid up, exclusive of 36 tugs laid up and in operation.

The value of the ships in operation or ready for spot delivery is $137,311,940; the value of the laid up ships is $87,906,375. The value of the tugs is $1,515,000.

The total value of the fleet as of July 1, 1923, was $227,732,615. Since July 1 the Board has sold six ships at a total sale price of $999,300.

The following table shows the various classes of vessels in possession of the Board, with their valuation:

Recapitulation of Classification and Valuation of Fleet as a Whole

	Spot or Operating	Laid Up
Cargo	$81,390,410 (365)	$75,568,296 (802)
Tankers	8,608,230 (19)	5,558,670 (26)
Refrigerators	923,300 (2)	3,098,136 (12)
Concrete tankers	.....	175,000 (7)
Concrete cargo	.....	7,000 (2)
Class "F" usable	.....	374,773 (5)
Damaged and obsolete	.....	474,500 (19)
Transport (cable)	.....	25,000 (1)
Transport type "B"	.....	1,225,000 (5)
Passengers	46,390,000 (30)	1,400,000 (3)
Total	$137,311,940 (416)	$87,906,375 (882)

Tugs—laid up and operating.. $1,515,000

Spot or operating	$137,311,940 (416)
Laid up	87,906,375 (882)
Tugs	1,515,000 (36)
	$226,733,315 (1334)
Sold since July 1	999,300 (6)
Total value of fleet as of July 1, 1923	$227,732,615 (1340)

Company Formed to Manufacture Blowers

The Connecticut Blower Corporation, Hartford, Conn., has been incorporated under the laws of Delaware, with a capital of $250,000. M. E. Keeney is president, C. H. Keeney, treasurer, and C. E. Keeney, secretary.

The new company has taken over the International Blower Company and the Hartford Sheet Metal Works. The products manufactured and installed are of a large variety, such as blowers and exhaust fans, blower systems of all kinds, dust collecting systems, exhaust systems, ventilating systems, etc.

New Linde Warehouse Established

A new warehouse has been established by The Linde Air Products Company at the B. & M. Wharf, Portland, Maine, in order to give even better service to users of Linde Oxygen and Prest-O-Lite Acetylene in the state of Maine. S. W. Jordan, 11 Exchange street, will be in charge of distribution.

Propeller Club to Act as Entertainment Committee for Marine Congress

THE Propeller Club of the Port of New York has accepted the invitation of the American Marine Association to act as the official Marine Congress Entertainment Committee. The Congress is to be held at the Waldorf-Astoria Hotel, November 5-10, and the Entertainment Committee will function for the benefit of the Marine Exposition, as well as the Congress, both events taking place during the same week.

In this connection, the Propeller Club has appointed a Central Committee, the members of which will be chairmen of sub-committees, as follows: W. Z. Gardner, chairman; Norris R. Sibley, hotel committee; Chester Roe, transportation committee; Nelson S. Tobey, ship inspections committee; E. M. Roberts, exposition committee; H. W. Parsons, entertainment committee. They will assist the delegates in obtaining hotel reservations, best methods of transportation, sight seeing tours around the world's greatest port, inspections of the various types of ships, including passenger, freight and war vessels, which will be placed at their disposal during Marine Week.

Marine Congress Official Badge

Over a Million and a Half to Be Spent in San Francisco Bay

THE sum of $1,674,000 will be expended in the near future on improvements to harbors and channels around San Francisco Bay by the Federal Government, according to an announcement by Col. Herbert Deakyne, U. S. Army Engineer Corps.

The main channel to San Francisco Bay is 36 feet at its greatest depth, and at some places, 30 feet. The plan of the army engineers is to make a 43 foot depth in all places and a width of 2,000 feet.

Radio Equipment for Nantucket Shoals Lightship

Commissioner of Lighthouses G. R. Putnam has informed the Philadelphia Maritime Exchange that the new Nantucket Shoals light vessel will be equipped with radio fog signaling apparatus and that the candlepower of the light will be increased to three thousand.

The radio signal will consist of a radio broadcast of four dashes every thirty seconds, followed by a silent period of twenty-five seconds, the signal to be transmitted on three hundred kilo cycle frequency, which is a one-thousand meter radio wave.

Except as stated, the new vessel will have the same characteristics and signals as the old vessel.

TRADE PUBLICATIONS

MONEL METAL.—A catalog on the uses of monel metal has been received from G. and J. Weir, Ltd., Cathcart, Glasgow. Among other things, this catalog calls special attention to diagrams showing the strength at high temperatures on monel and various other metals. Another special point brought out in the book is the resistance of monel metal to corrosion and its uses in a variety of industries.

CLEANING BOILER TUBES.—In a pamphlet recently issued, the Heine Boiler Company, of St. Louis, states that tests have shown that one-fiftieth of an inch of scale deposited on a steel plate will reduce the rate of heat conduction 60 to 75 percent. The means provided in Heine boilers for maintaining clean tubes are described in this pamphlet, and details of the Bayer soot blower, which is furnished with every Heine boiler, are included.

THERMIT RAIL WELDING.—The Metal & Thermit Corporation, New York, has issued a new thermit rail welding pamphlet, which brings up to date the whole subject of thermit rail welding to cover the many recent improvements in economy and efficiency.

HISTORY OF THE NIPPON YUSEN KAISHA.—The Nippon Yusen Kaisha, Tokyo, Japan, which came into existence in 1885 as a result of the amalgamation of two Japanese shipping concerns, has presented in booklet form a short but complete history of the line which is to a great extent the history of the shipping industry of Japan. This book is written in English for special distribution in this country and England. It offers an excellent means of becoming acquainted with the progress of the industry in the Eastern countries.

PORTABLE ELECTRIC TOOLS.—A miniature catalog sent out by the Hisey-Wolf Machine Company, Cincinnati, Ohio, briefly describes the complete line (112 different types and sizes of tools) of Hisey electric products. This book has been prepared principally for dealers and agents who know the value or necessity of placing complete condensed practical information in the hands of all customers and prospects.

ELECTRICAL FIXTURES.—Details of switches and plug receptacle housings and other types of condulets in a great variety of forms for special usage in both land and marine practice are listed in an illustrated bulletin sent out by the Crouse-Hinds Company, Syracuse, N. Y. QE housings are made to inclose snap switches, key switches, attachment plug receptacles and 125, 250 and 600-volt Crouse-Hinds plug receptacles. Further information relative to various combinations of bodies and housings will be furnished upon request by the company.

COMMUTATOR TRUING DEVICE.—Several leaflets illustrating and describing the Jordan commutator truing device have been made available by Jordan Brothers, Inc., 74 Beekman street, New York. It is stated that this device supplies the only correct method of grinding commutators or slip rings in their own bearings, leaving them true and smooth. The device grinds the commutator through the medium of an abrasive wheel, is applied quickly and easily adjusted without special skill required of the operator and is used equally well on flush mica or under-cut commutators without bridging copper across the mica. No interruption of service is necessary, for machines may carry their load while being ground.

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Foreign Shipping and Shipbuilding Activities

British Shipping Exhibition Repays Visit to Olympia

By James Swan*

LONDON, Eng. (Special).—The Shipping Exhibition now being held at the Olympia, London, is full of interest for all who are even remotely connected with the building and operation of ships. One is at once struck by the neatness and good arrangement of the various exhibits, as well as the very large range of subjects covered by them.

NUMEROUS AUXILIARIES EXHIBITED

The exhibit of auxiliary machinery of various kinds is especially comprehensive, and one is particularly impressed by the solid and substantial character of the various machines. The British surely have learned to put material "where it does most good."

In this class were particularly noted the Worthington Pump Company, James Howden and Company, Wallsend Slipway and Engineering Company (oil burning equipment), The Williams-Janney hydraulic speed gear (similar to the American Waterbury speed gear) and the Kirkaldy evaporators, etc.

Other interesting exhibits deserving notice were Wales and Dove's bitumastic enamel, etc., the Parsons Turbine Company, Welin davit, Brown-Lennox Chain Company, Sperry gyro compass and a large number of electric welding machines of various types, as well as wireless telegraphs and similar apparatus.

These are a few of the exhibits which were especially noticed—there are dozens of others of equal interest, but too numerous to mention in a passing notice.

MOTORBOAT SHOW IN THE ANNEX

In the annex, a new building, there is a large collection of motorboats and gasoline (or petrol) engines. Some of the hulls are most beautifully constructed and the large exhibit of engines by Thornycroft is particularly fine.

Taken altogether, the exhibition is most decidedly worth visiting, and the substantial and wholesome character of almost everything shown leaves one with a good impression of the character of materials and outfits which enter into the construction of British vessels.

*Editor of MARINE ENGINEERING AND SHIPPING AGE.

Australian Government Shipping Venture Costly

THE financial statement of the Australian Commonwealth's fleet of merchant ships, as summarized by the Transportation Division of the Department of Commerce, gives the present book value of the fleet as £12,766,588, but the current market appraisal of the fleet is put at £4,718,150. The account of Government operation shows a net loss of £493,271. In addition, the Government also lost £2,300,000 on its contract for 14 American wooden steamers, thus the total losses on the Australian Government's venture in shipbuilding and shipowning are close to £11,000,000.

Financial Aid for Shipowners Planned in France—Eight New Liners Being Built

By Our Paris Correspondent

A QUESTION which is at present stirring much interest both in shipping and parliamentary circles is that relative to the institution of a private banking company which should make advances of money to shipowners in order to enable them to hold out until the prevailing difficulties in shipping affairs have disappeared. The necessity for such an organization—called the Credit Maritime—has been echoed for months in French papers.

Several interesting developments have taken place in that respect in the course of the last few weeks. When the Government had ascertained that the proposed organization would meet with the unanimous approval of all concerned in shipowning in this country, they appointed a committee, the Commission Interministerielle, which was intrusted with the task of investigating the question and making suggestions towards the realization of the scheme. That committee has recently issued its report.

The most important innovation to be pointed out in connection with the program of the Credit Maritime lies in the fact that not only the real value of the vessels owned by the firm concerned should be taken as security for loans made, but also the personal guarantee of that firm; that is to say, its financial and traffic prospects, the conditions of its management, the efficiency of its fleet, etc., all of which are considerations which could not be taken into account as securities in respect of loans made on mortgages. The main question now is the constitution of the initial capital of the undertaking.

MESSAGERIES MARITIMES BUILDING EIGHT PASSENGER VESSELS

The Messageries Maritimes, the big French steamship company which is running regular services between France, the Far East, Madagascar and the Mediterranean countries, has just decided on the names which are to be given to the new vessels under construction to its account. It is noteworthy in passing that this company has the largest building program in France, the reason being that the firm has accepted the control of the Government in exchange for a full financial support.

At present this company has no less than 8 passenger vessels under construction to its account. The *Aramis*, of 20,300 tons displacement, is being completed at the yards of the Chantiers de la Gironde at Bordeaux. Her propelling machinery consists of 2 steam turbines of the Schneider-Zoelly type, each driving one propeller shaft through double reduction gearing, the total power developed being about 8,000 horsepower. The same yard is also building a sister ship which is to be named *D'Artagnan*.

To the account of the Messageries Maritimes, also, there is under construction at the yards of the Société Provencale de Constructions Navales at La Ciotat, near Toulon, three passenger vessels. Two of small size (the *Champollion* and the *Mariette*) will be placed in service on the Mediterranean lines of the company, while the third one, the *Leconte de Lisle*, of 15,100 tons displacement, will be run on the Indian Ocean line. A sister ship to the *Leconte de Lisle*, which is to be named *Explorateur Grandidier*, is under construction at the yards of the Chantiers et Ateliers de Saint-Nazaire-Penhoet.

In addition to these 6 vessels, the Messageries Maritimes has under construction in German yards two passenger vessels of the *Aramis* type, which will be run with the *Aramis* and the *D'Artagnan* on the Marseilles-China line. They have been ordered from German yards in accordance with the Versailles Treaty.

First Heavy Oil Motor Vessel for French Fishing Fleets

A STEP which portends a complete revolution of the French fishing industry and the opening of an important market for internal combustion, heavy oil motors, of the Diesel or semi-Diesel type, is being taken at Boulogne-sur-Mer, where the first installation of this kind is being made on one of the largest trawlers of the fishing fleet, according to a special report to the Department of Commerce. The event is heralded as the death signal for the coal-burning steam type of vessel, which is now exclusively employed in the French fishing industry.

Having experienced two years of discouraging losses—the receipts of 1921 and 1922 having been insufficient to meet the expenses of operation—the owners of the fishing fleet vessels find themselves forced to discover a means whereby their ships may put to sea and return without spending too much money for fuel. This situation, which becomes more acute daily, seems bound to aid in the development and installation of the new system of motor propulsion on the vessels of the fleet.

The motor being installed is a "Chaléassiére" of 500 horsepower, which burns mazout. It is a simplified type of Diesel, and it is estimated that its maximum consumption will be one and one-half tons of mazout for each twenty-four hours.

Predicating estimates on the consumption of one and one-half tons of mazout a day, the cost of operation of the motor being installed would be 600 francs for each twenty-four-hour period, the price of the oil today being 400 francs per ton. This is the price quoted for the fishing shipowners, who, it is estimated, would buy quantities of 50 or 100 tons at a time. This price is quoted with the Franco-American rate of exchange at 14.96 francs to the dollar.

With coal at 152 francs per ton, the steam-propelled fishing vessel of 500 tons horsepower consumes daily about 10 tons. This calls for an outlay by the owner of 1,520 francs daily for coal alone. And with a bunker capacity of 300 tons, the vessel can remain at sea for only thirty days.

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Marine Construction News of the Month

Ship Contracts — New Ship Concerns and Shipyard Improvements—Terminal Projects—Government Contracts

SHIPBUILDING AND REPAIRS

Engine Repairs, Savannah, Ga.—The Shipping Board steamer Cripple Creek is at Savannah for repairs to her engines.

Steamer Drydocked, Cleveland, O.—Steamer W. H. Donner, damaged by grounding recently, has been placed in drydock at Cleveland for repairs.

Overhauling of Steamer, San Pedro, Cal.—The steamer American, damaged to the extent of $210,000 by fire at sea, has been taken to San Pedro for overhauling.

Vessels Drydocked, Chester, Pa.—The steamships Sunoil and J. N. Pew, of the Sun Company, have been drydocked for thorough overhauling at the Chester plant.

Ship Work, Mobile, Ala.—The Alabama Dry Dock and Shipbuilding Company, Mobile, Ala., is completing repairs to the steamship Normania and also the Shenandoah.

Damaged Steamer Repairs, Cleveland, O.—The damaged steamer J. S. Ashley, which recently grounded on Crab Island shoal, Great Lakes, has been taken to Cleveland for repairs.

Ferry Repairs, Jacksonville, Fla.—The ferryboat Duval, which plies between Jacksonville and South Jacksonville, went to the Gibbs drydock recently for repairs to a broken propeller shaft.

Japanese Steamer Drydocked, Portland, Ore.—The Japanese steamer Yonan Maru was recently taken to Portland for drydocking and repairs after having grounded at the mouth of the Columbia River.

Diesel Engine Installations, Pacific Coast.—A 110-horsepower Diesel engine is being installed in the motorship Sudan for the Daniel Contracting Company by the Pacific Diesel Engine Company, of Oakland, Cal.

Hull Damage Repairs, Beaumont, Tex.—Vogemann-Goudriann Company's steamer Deutchfeld is at Beaumont to have her hull, which was damaged badly when it struck a submerged anchor in that harbor, repaired.

Ferryboat Launched, Wilmington, Del.—The Pusey & Jones shipyard in Wilmington has launched the ferryboat Ocean City, the second all-steel ferryboat built this summer for the Philadelphia and Reading Railway.

Tanker at Navy Yard, Norfolk.—The naval tanker U. S. S. Trinity, which recently sailed from Baytown, Tex., for Hampton Roads with a cargo of oil, has been taken to the navy yard for drydocking and repairs.

Miscellaneous Repairs, Chester, Pa.—The Sun Shipbuilding and Drydock Company, of Chester, Pa., has been awarded the contracts for miscellaneous repairs and painting the steamships Hesporos and Fredness.

Miscellaneous Work, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation, San Francisco, has been awarded the contract for making repairs to stern, frame and bottoms of the American Hawaiian freighter Dakotan.

Steamer Docked, Baltimore, Md.—The steamer Robin Adair, operated by Norton, Lilly Company, on their west coast route, was drydocked by the Maryland Dry Dock Company for attention previous to loading for the west coast.

Engine Room Repairs, Mobile, Ala.—The steamship Stavangeren is at the yards of the Alabama Dry Dock and Shipbuilding Company for engine room repairs and also to have 100 grate bars, cast in the yard's foundry, installed.

Contract Awarded, San Francisco, Cal.—The Bethlehem Shipbuilding Corporation, with a price of $51,240 and twenty-eight days (low bidder), received the contract for generally overhauling the United States transport Thomas.

Towboat Awarded, Marietta, O.—The Marietta Manufacturing Company of Marietta, O., has been awarded a contract for a towboat, 135 feet by 30 feet, for the Vesta Coal Company, of Pittsburgh. The boat will be for use on the Ohio river.

Shipyard Activities, West Coast.—The Shipping Board vessel West Mahwah is at the Hanlon yards for a new stern frame; bids have been tendered for the reconditioning of the steamers Castletown and Castlepoint, by the McCormick Steamship Line.

Bids Rejected, West Coast.—Bids submitted for repairs on the steamer West Carmago, by California shipyard companies, have been rejected. The prices submitted were: Moore, $1,176; Hanlon Drydock Co., $1,181.50, and the Bethlehem yard, $1,186.50.

Repainting, etc., Los Angeles, Cal.—The liner Dorothy Alexander has been shifted to the yard of the Los Angeles Shipbuilding and Drydock Company for repainting and minor overhauling. The Ruth Alexander has also been taken to the same yard for repairs.

Work at Charleston Yard.—The Shipping Board steamship Western Wave, one of the idle fleet in the Ashley river, has been removed to the Charleston Drydock & Machine Company works for overhauling. The dredge Savannah, which is engaged in harbor work, went to the same yard for numerous repairs.

Cramp Shipyard Activities, Philadelphia, Pa.—The Cramp Shipbuilding and Drydock Company has completed repairs on the Black Diamond Steamship Company's steamship Anaconda and is now making miscellaneous repairs to the United Fruit Company's steamship Runa.

Barge Contract, Mobile, Ala.—The Alabama Dry Dock & Shipbuilding Company, of Mobile, has received a contract for the construction of three steel barges for the Tennessee Coal & Iron Company, a subsidiary of the U. S. Steel Corporation. Work will be started in the near future.

Steel Boom Contract.—The contract for two steel booms, bids for which were opened by the U. S. Engineer Office, Louisville, Ky., on August 27, has been awarded to the Clyde Iron Works, Duluth, Minn., at a price of $1,580, delivery to be made in 50 days. Ten bids were received, ranging up to $3,300.

Low Bidder, San Francisco, Cal.—At the opening of tenders for repairs to the Pacific Mail liner Colombia, the General Engineering Company was low bidder for the engine work on the vessel, with a price of $433. The same company was also low bidder on repairs to the Pacific Mail steamer Corinto.

Todd Equipment on Vessel, Newport News, Va.—The Newport News Shipbuilding and Dry Dock Company, at whose plant in Virginia the President Buchanan is being reconditioned for the Shipping Board, has awarded a contract to the Todd Shipyards Corporation for the installation of Todd burners, fronts and equipment.

Repairs Bids, New York.—The Morse Dry Dock & Repair Company was the low bidder for general repair work on the steamship Luceric, when tenders were opened by Holder, Weir & Boyd, on September 4. The prices were: Morse, $1,015; Alderton, $1,100; Staten Island Shipbuilding Company, $1,122; Robins, $1,280, and New York Harbor, $1,740.

Cleaning and Painting, Portland, Ore.—The steamer West Cayote, operated by the Columbia-Pacific Shipping Company in the oriental service for the Shipping Board, has been placed on the St. Johns drydock plant of the Port of Portland, for cleaning and painting her hull. The steamer West Kader is also on the same docks for voyage repairs.

Will Remodel Tug, Jacksonville, Fla.—Announcement is made by Captain A. B. Potter, of the Jacksonville Forwarding Company, that the tug General D. B. Stanley has been purchased from Norfolk Shipping interests and that the steamer would probably be remodelled. She has a length of 110 feet and is equipped with about 600-horsepower engines.

Shipyard Activities, West Coast.—The Bethlehem Shipbuilding Corporation has been awarded the following work: Steamer West Sequana, of Struthers & Barry fleet, for general overhauling; tanker La Placencia, repairs to damaged bottom. The company has completed the work on the tanker John D. Archbold, which consisted of replacing and repairing plates damaged in grounding.

Tug Launched, Portland, Ore.—The tug James W., Diesel driven, to join the Shaver Transportation Company's line of towboats, was launched recently from the plant of the Portland Shipbuilding Company. She has a tunnel hull 90 feet long, 20 feet beam, and depth of five feet. A 300-horsepower Atlas Imperial engine has been installed. The company expects to use her in harbor work.

Low Bidder for Work, Los Angeles, Cal.—At the opening of bids by the Shipping Board for removing turbines and installing reciprocating engines in its vessel Miskianza, the Los Angeles Shipbuilding and Drydock Company was low bidder at $109,820. The other bids were: Bethlehem Shipbuilding Corporation, $113,185; Moore Drydock Company, $113,375, and the United Engineering Works, with a bid of $123,642.

Repairs at Moore Yard, Oakland, Cal.—The Moore Drydock Company has received the contract for repairs to the hull of the Norwegian tanker San Joaquin, owned by Wilhelm Wilhemson, but under charter to the Union Coal Company. The damage was caused by grounding some time ago. The contract was awarded at a price of $18,735 and ten days, the Bethlehem Shipbuilding Corporation tendering a bid of $19,875 and ten days. Besides other work, eight new plates will be installed. The same yard is storing a new tailshaft for emergency services in the tanker Sylvan Arrow.

Ship Work, Oakland, Cal.—The Hanlon Shipyard has showed marked activity recently and has received the following vessels for miscellaneous repairs: steamer Nome City, drydocking and general overhauling, including the installation of a new lead sleeve, new tailshaft, bronze wheel, and also renewal of her stem and canvassing of her deck; lumber carrier Mukilteo, motorship Lassen, steam schooner Horace X. Baxter, steamer Northland, lightship No. 83, ship Monongahela, steamer Vinita and barkentine Monitor for drydocking and general overhauling. To have her decks calked and for the installation of new foremast and bowsprit, the barkentine Mary Winkelman is on drydock at the same yards.

Toss of Coin Decides Contract, San Francisco, Cal.—A contract involving more than $3,000 was settled between two officials of San Francisco shipping firms by the toss of a coin. The contract called for work on the United States transport Grant. When the tenders were received it was found that there was a misunderstanding in the amount of work to be covered in the bid, the only two companies bidding on the full work being the General Engineering Company and the United Engineering Company. The work on the transport had to be finished as quickly as possible and therefore Frank Fox, chief engineer for the General Engineering Company, called up Armes, of the United Engineering Works, who suggested that a coin be tossed with the United Engineering Company. Two half-dollars were flipped with the result that the United Engineering Works won.

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PORT IMPROVEMENTS

Harbor Improvements, Berkeley, Cal.—Alameda Company plans election to vote on $50,000-$100,000 bonds for harbor improvements.

Elevator, Valley View, Tex.—Whaley Mill & Elevator Company is having plans prepared for an elevator, the cost of which will exceed $60,000.

Seawall and Yacht Basin, Sarasota, Fla.—H. F. Atkinson and associates, Miami, plan seawall and yacht basin at Sarasota to cost $100,000. Engineer not announced.

Pier, Philadelphia, Pa.—Department of Wharves, Docks & Ferries awarded the contract for completing Porter Street Pier 84 to Snare Corporation, 1524 Chestnut Street. $500,000.

River Terminal, Cincinnati, Ohio.—Cincinnati River-Rail Transfer Company, Front and Harriet Streets, plans river freight terminal, 50,000 tons' capacity. $50,000-$75,000.

Wharf, Pembroke, Ont.—The Department of Public Works, Parliament Building, Ottawa, will soon take bids for a wharf to cost $125,000. K. M. Cameron, acting chief engineer.

Levee, Sacramento, Cal.—The contract for the removal of Y street levee, 144,744 cubic yards earth excavation, has been awarded to Byrne, Yost & Treatster, 2512 N street. $60,049.

Wharf, Harrop, B. C.—Sealed proposals will be received by R. C. Desrochers, Secretary of the Department of Public Works, Ottawa, until October 2, for a floating wharf at Harrop.

Wharf, Sorel, Que.—Bids were received on September 4 by R. C. Desrochers, secretary, Department of Public Works, Ottawa, Ont., for reconstructing concrete high level wharf here.

Dam on Colorado River, Bronte, Tex.—Coke Runnels Water Improvement District 1 plans dam on Colorado River, ditches, laterals, etc. $4,500,000 to $5,000,000. C. C. Holder, Bronte, engineer.

Grain Elevator, Chippewa Falls, Wis.—Farmers Produce Company, c/o F. W. Anderson, mgr., 15 West Central street, will build 2-story, brick, plain foundation by day labor. $40,000. Private plans.

Dredging, Los Angeles, Cal.—Board of Harbor Commissioners awarded the contract for dredging 100,000 cubic yards fronting wharves to the United Dredging Company, Central Building. $0.244 per cubic yard.

Dredging, Newport, Cal.—Parkinson Syndicate Interests have awarded the contract for dredging channel in vicinity of county turning basin to Los Angeles Dredging Company, Seaside Park, Long Beach, $500,000.

Bids for Canal, Port Colborne, Ont.—Dominion Department of Railways & Canals, Parliament Buildings, Ottawa, will soon take bids for Port Colborne section of Welland Canal. $10,000. W. A. Bowden, chief engineer.

Hydraulic Dredging, Port Arthur, Ont.—Dominion of Canada, Department of Public Works, Parliament Buildings, Ottawa, awarded the contract for hydraulic dredging in Port Arthur harbor to Canadian Dredging Company, Midland. $246,920.

Breakwater, Toronto, Ont.—The Department of Public Works, Parliament Buildings, Ottawa, Ont., awarded the contract for 4,440 lineal feet of concrete breakwater on the foundation, Toronto, to R. Miller & Sons, Lumsden Building. $1,030,000.

Dyke, New Westminster, B. C.—South Westminster Dyking Commissioners, Cloverdale, awarded the contract for a 4½-mile earth dyke along Fraser River, opposite New Westminster, to A. B. Palmer & Company, 736 Granville Street, Vancouver. $35,000.

Retaining Walls, etc., Ohio.—P. R. Murray, director of Public Works, Hartman Building, Columbus, will soon take bids for repairs to concrete and stone walls, also building new retaining walls, at Buckeye Lake in Fairfield and Licking Counties. $40,000.

Docks, Dikes, Levee Work, etc., Shreveport, La.—The city of Shreveport is having preliminary plans and surveys made for reinforced-concrete docks, dikes and levee work. $400,000 to $450,000. C. E. Smith, Railway Exchange Building, St. Louis, Mo., engineer.

Bids Rejected, Clarksdale, Miss.—The Board of Levee Commissioners, Yazoo, Mississippi Delta, rejected bids for enlarging 5-mile Ward Lake levee containing 10,000 cubic yards of topping, 75,000 cubic yards of barquetta enlargement. W. L. Head, Clarksdale, engineer.

Canals, etc., Newport, Ark.—Cache River Drainage District is making plans for drainage ditches, canals, etc., in Jackson and Poinsett Counties. $1,000,000. Morgan Engineering Company, Goodwin Inst., Memphis, Tenn., and Bowman Engineering Company, Newport, engineers.

Wharf and Warehouse, New Orleans, La.—Board of Port Commissioners, New Court Building, is having plans prepared for a substructure and superstructure concrete wharf, pile foundation, also one-story steel and metal warehouse, 400 to 1,600 feet long, 150 feet wide. $500,000.

Wharves, Houston, Tex.—The contract for 1,720 feet of wharves has been awarded by the Harris County Navigation District, in three sections, as follows, to Doulutt & Williams, Carter Building: reinforced-concrete structure, concrete piling, $669,000, and timber piling, $284,000.

Levee, Yazoo City, Miss.—The Clark Construction Company, of Memphis, Tenn., has been awarded a contract by the Rocky Bayou Levee District for a levee on the east bank of Yazoo River, north bank O'Neal's Creek and south bank of Short Creek, 2 canals, etc., at a price of $150,000.

Creosoting Lumber, New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans, at their office, Suite 200, New Orleans Court Building, on September 6, for creosoting of second hand lumber furnished by the Board. Requisition E. D. 13912.

Coal Pier Under Way, Norfolk, Va.—The construction of steel framing of the new $3,000,000 coal pier of the Virginian Railway at its Sewells Point has begun, the foundation having been completed. The contract for the steel framing has been placed with the Bethlehem Steel Company.

Contract Awarded, Chico, Cal.—Butte Creek Drainage District awarded the contract for cleaning out Butte Creek to California Dredging Company, Hobart Building, San Francisco, 80,000 yards excavation in outlet drains at $0.20 per yard and 20,000 yards excavation in drainage canal, $0.25.

Excavation, Riverhead, N. Y.—Bids were received on September 27 by the Salt Water Bays Commission at the office of the State Engineer and Surveyor, Telephone Building, Albany, for excavating channel connecting Moriches, Quantuck, Shinnecock and Peconic Bays, Suffolk County. D. B. LaDu, chairman.

Wharf Extension, New Orleans, La.—Sealed proposals were received by the Board of Commissioners of the Port of New Orleans, Suite 200, New Court Building, on September 13, for clearing the site for an extension of the Poland Street Wharf on the site of the burned Army Supply Base Wharf. J. H. Walsh, general manager. Requisition E. D. 13789.

Grain Elevator, Houston, Tex.—Harris County Navigation District is having plans prepared for a concrete grain elevator, 900-foot frontage on the ship channel, headhouse, tank storage and grain carriers, initial capacity 1,000,000 bushels, ultimately 6,000,000 bushels. $1,000,000. E. A. Tucker, Court House, engineer. J. Metcalf & Company, 108 South La Salle Street, Chicago, consulting engineer.

GOVERNMENT WORK

Generators, etc., Washington, D. C.—U. S. Engineer rejected bids for dredging in Scuppernong River.

Breakwater Gulfport, Miss.—U. S. Engineer plans 1,400-foot breakwater at ship basin here. E. North, U. S. E. C., Mobile, Ala., engineer in charge.

Dredging, Honolulu, H. T.—Specification 4891—The Bureau of Yards and Docks, Navy Department, Washington, D. C., plans dredging at Naval Wharf here.

Steel Barges, Portland, Ore.—Sealed proposals were received by the United States Engineer Office, 2nd District, Portland, Ore., on September 7, for six, 120-foot by 34 feet by 7 feet 6 inches, steel barges.

Lock, Pittsburgh, Pa.—Sealed proposals were received on August 23 at the U. S. Engineer Office, Pittsburgh, for constructing Lock 7, Monongahela River.

Levee, Kennett, Mo.—St. Francis Levee District plans rebuilding 12-mile levee, 1,000,000 cubic yards dry earth excavation. J. D. Mitchell, Puxico, engineer.

Dredging, Galveston, Tex.—U. S. Engineer, Galveston, awarded the contract for dredging in Texas City Channel to J. Jacobson, 2311½ Avenue C, $24,780.

Dredging, Boston, Mass.—Sealed proposals were received on August 30, at the office of the U. S. Engineer, Custom House, for dredging in Beverly Harbor.

Dredging, Oakland, Cal.—The U. S. Engineer Office, San Francisco, Cal., received sealed proposals on September 6, 1923, for dredging in Oakland Harbor, Cal.

Rock Removal, Seattle, Wash.—Sealed proposals were received on September 1, 1923, for rock removal in Willapa River, Wash., by the U. S. Engineer Office.

Dredging, Baltimore, Md.—Sealed proposals were received by U. S. Engineer Office, on August 13, for dredging 2,584,700 cubic yards from entrance of channel, here.

Dredging, Petaluma Creek, Cal.—Sealed proposals were received by the U. S. Engineer Office, San Francisco, Cal., on August 30, for dredging in Petaluma Creek, Cal.

Dredging, Port Isabel, Tex.—The State and Federal Government has awarded the contract for dredging Port Isabel Channel to an 18-foot depth, to J. Jacobson, Galveston. $314,000.

Riprap Stone, Baltimore, Md.—Bids were received on August 15 by the Superintendent of Lighthouses for furnishing and placing 2,500 tons of riprap stone at Lighthouse Stations, 5th District.

Breakwater, Marquette, Mich.—U. S. Engineer, Custom House, Duluth, Minn., awarded the contract for repairs to breakwater at Marquette to Tidurocher Company, Detour, Mich., at $62,379.

Stone, Harbor Beach, Mich.—U. S. Engineer 337 Federal Building, Detroit, received no bids on August 16 for furnishing and placing 10,000 tons of stone on breakwater here. Will readvertise.

Dredging, New York, N. Y.—Sealed proposals were received on August 9 at the U. S. Engineer Office, 616 Army Building, for dredging and rock removal in Area 2, New York and New Jersey Channels.

Harbor Improvements, Charlotte Harbor, Fla.—The War Department has announced an allotment for river and harbor maintenance and improvement work, including $20,000 for Charlotte Harbor, Fla.

Bulkhead, Far Rockaway, N. Y.—Atlantic Beach Associates, Inc., plans 1,500 feet of bulkhead, on Far Rockaway Bay. J. R. Spelman, 405 Lexington avenue, New York, consulting and supervising engineer.

Dredging, Far Rockaway, N. Y.—Atlantic Beach Associates, Inc., plans the dredging of 600,000 cubic yard sand fill. J. R. Spelman, 405 Lexington avenue, New York City, consulting and supervising engineer.

Widening Channel, Detroit, Mich.—J. B. Breyman, 2052 Robinwood avenue, Toledo, Ohio, was awarded the contract for widening Livingston Channel, Detroit River, by U. S. Engineer Office, $293,780.

Removal of Wreck, Beaufort, N. C.—Sealed proposals, in duplicate, were received at the U. S. Engineer Office, Wilmington, N. C., on August 24, for removing wreck of tug Juno from the ocean bar at Beaufort Inlet, N. C.

Contract Awarded, Baltimore, Md.—U. S. Engineer Office awarded the contract for dredging in Queenstown Harbor, Md., to Calkins Dredging Company, Inc., 604 Bankers Trust Building, Norfolk, Va., at a price of $5,564.

Removal of Pile Protection, Chicago, Ill.—U. S. Engineer, 537 South Dearborn street, awarded the contract for removal of pile protection in harbor here, to Great Lakes Dredge & Dock Company, 104 South Michigan avenue. $8,555.

Levees, etc., Wisconsin.—State Legislature has appropriated $50,000 to strengthen and rebuild levees and dams on Fox and Wisconsin Rivers, Fond du Lac and Winnebago Counties. J. D. Mack, State Capitol, Madison, engineer.

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Steel Derrick Boat Hull, Mobile, Ala.—Sealed proposals were received by the U. S. Engineer Office, on August 6, 1923, for furnishing and delivering one steel derrick boat hull, length 80 feet, beam 34 feet, molded depth 5 feet.

Centrifugal Pump, Louisville, Ky.—The U. S. Engineer Office, Louisville, Ky., opened bids August 13 for one two-stage, 6-inch, vertical centrifugal pump, to be installed at the power house at Louisville and Portland Canal, Louisville, Ky.

Breakwater, Alpena, Mich.—U. S. Engineer, 337 Federal Building, Detroit, awarded the contract for furnishing and placing 11,700-ton core stone and 10,300-ton armor stone for rubble mound breakwater, Alpena, to T. L. Durocher Company, Detour. $76,340.

Construction of Superstructure, Ludington, Mich.—U. S. Engineer Office, Milwaukee, Wis., received sealed proposals on August 28 for removing stone-filled timber superstructure and constructing concrete superstructure on North Breakwater at Ludington, Mich.

Pump, Louisville, Ky.—U. S. Engineer, Post Office Box 72, awarded the contract for one vertical centrifugal pump to deliver 7,000 gallons per minute against head of 25 feet, complete with motor base, etc., to Morris Machine Works, Baldwinsville, N. Y. $1,210.

Bids Rejected, New York, N. Y.—J. H. Delaney, Commissioner of Docks, Pier "A," North River, has rejected bids on Item 4, for dredging at street cleaning dumps in Boroughs of Manhattan and Brooklyn; also received no bids on Item 2. Will re-advertise.

Dredging, New Orleans, La.—The contract for dredging five miles in the Calcasieu-Sabine Section of the Intracoastal Waterway, 998,000 cubic yards excavation, has been awarded by the U. S. Engineer Office, 329 Custom House, to H. Reynolds, Maison Blanche Building, at a price of $128,836.

Excavation, Delaware.—The contract for completing, widening and dredging Chesapeake and Delaware Canal, creating new entrance from Delaware Bay and improving entrance at Chesapeake Bay, Delaware and Maryland, 6,000,000 cubic yards excavation, to Atlantic, Gulf and Pacific Company, 13 Park Row, New York City, Sections A and D, $740,688; Arundel Corporation, Pier 2, Pratt street, Baltimore, Md., Section B, $257,359, by the United States Engineer Office, Wilmington, Del.

SHIPPING DEVELOPMENTS

United American Lines.—It is reported from abroad that the passenger steamship Cleveland, formerly the King Alexander and recently acquired by the Harriman interests for the United American Lines, will sail from Hamburg for New York with a full passenger list on October 23. The ship is being converted into a cabin class steamer at the Blohm & Voss shipyard.

River Transit Company.—Freight carrying on the Mississippi between Topeka, Kan., and St. Paul, Minn., has been resumed after a lapse of eight years. Four barges, owned by the River Transit Company, of St. Paul, are to be used exclusively for freight carrying.

United Steamship Company.—According to a report from the Department of Commerce, Washington, D. C., the United Steamship Company announces that it has decided to open a new regular line between Montreal and Copenhagen for the transportation of grain and piece-goods to Danish, Scandinavian and Baltic ports.

Strachan Steamship Company.—Announcement has been made by the traffic bureau and the foreign and coastwise committee through the Jacksonville Chamber of Commerce that the city of Jacksonville will have a direct steamship line to Pacific coast ports, and the first vessel will begin loading cargo at Puget Sound ports for this city this month. The Strachan Steamship Company with the Moore & McCormack Company, steamship agents and operators, have made the arrangements and will operate five vessels in the service between the northwest and this port.

Detroit and Cleveland Navigation Company.—The establishment of a passenger route between Detroit and Chicago early next summer, with stops at Mackinac Island, has been announced by A. A. Schantz, president and general manager of the D. & C. Navigation Company. The new route has been made possible by the building of two new steamships by the D. & C. Company, said to be the largest operating on any inland waterways in the world. These boats will be in commission next summer and will be put in operation between Detroit and Buffalo and, according to Mr. Schantz, the two boats now in operation on the Cleveland line will be put on the new route to Chicago. The first of the two twin steamships has been launched and christened the Greater Detroit. The second ship will slide down the ways in about six weeks and will be named Greater Buffalo. Mr. Schantz said that these two new boats will allow the company to put the two large steamships, Eastern States and Western States, on the Chicago run. A schedule of 36 hours between Detroit and Chicago will be put in effect at once and a single stop will be made at Mackinac Island.

Holland-American Line.—The Holland-American Line has announced that its steamer Rotterdam will sail from New York on February 6 of next year on a Mediterranean luxury cruise. Passengers are already being booked and this trip promises to be unique and different in many ways from the usual tour cruise. The cruise will cover calls at Madeira, Spain, Algeria, Athens, Constantinople, Palestine, Egypt, Italy and the Riviera. Final arrangements are being completed by representatives of the company with hotels, railroads and others to receive the visitors. The cruise is limited to 500 guests, thus eliminating all crowding or confusion as the Rotterdam can accommodate 1,000 persons.

White Star and American Lines.—Announcement of a joint passenger and freight service to be operated between New York and Hamburg by the White Star Line and the American Line has been made at New York. The American Line has maintained a service for cabin and third class passengers and freight between New York and Hamburg since 1920. At present it is maintained by the Manchuria, Mongolia, Minnekahda, Finland and Kroonland, all American flag ships. Owing to the disadvantages under which they labored, three of these steamers, the Finland, Kroonland and Manchuria, are to be transferred to the Panama Pacific for operation between New York and California ports, beginning in October.

The White Star Line has been operating a service for cabin, third class and freight between New York and Bremen since the spring of 1923, with the Pittsburgh and the Canopic.

Under the new arrangement, the White Star Line will transfer its German business from Bremen to Hamburg, where it will share with the American Line its new terminal at the Ross Quay, one of the best in Europe. It will dispatch its ships on dates alternating with those of the American Line, thus making a combined American and English flag service.

The first White Star Line sailing from New York in the new joint service will be that of the Canopic, October 18. The Pittsburgh will follow on November 8. The American Line's first sailing under the new schedule will be the Mongolia, October 25, and the Minnekahda, November 1.

MARINE SOCIETIES

AMERICA

American Society of Naval Engineers
Navy Department, Washington, D. C.
Secretary-Treasurer—Commander S. M. Robinson, U. S. N., Bureau of Engineering, Navy Department, Washington, D. C.

Society of Naval Architects and Marine Engineers
29 West 39th Street, New York
Secretary and Treasurer—Daniel H. Cox.

National Association of Engine and Boat Manufacturers
29 West 39th Street, New York City
Secretary—R. R. A. Hand.

United States Naval Institute
Naval Academy, Annapolis, Md.
Secretary and Treasurer—Commander H. K. Hewitt, U. S. N.

American Marine Association
15 Park Row, New York
President—E. A. Simmons.
Secretary—K. W. Heinrich.

The New York Tow Boat Exchange
11 Moore St., New York.
Secretary—Irving G. Keller.

Port of New York Authority
11 Broadway, New York
Chairman—E. H. Outerbridge.
Secretary—William Leary.

Marine Engineers' Supply Men's Association
Room 507, 30 Church Street, New York.
Secretary—Robert P. Jones.

National Association of Masters, Mates and Pilots
National Secretary—M. D. Tenniswood, 308 Vine St., Camden, N. J.

American Society of Marine Designers
Secretary—B. G. Barnes, 202 Kendrick Ave., Quincy, Mass.

National Marine Engineers' Beneficial Association
Headquarters 311-315 Machinists Building, Washington, D. C.
Secretary-Treasurer—George A. Grubb.

Atlantic Coast Shipbuilders' Association
1600 Walnut Street, Philadelphia, Pa.
Secretary—C. S. King.

American Steamship Owners' Association
11 Broadway, New York
President—A. G. Smith.
Vice-President and General Manager—Winthrop L. Marvin.

United States Ship Operators' Association
149 Broadway, New York
President—C. H. Potter.

National Merchant Marine Association
Munsey Bldg., Washington, D. C.
President—Hon. J. E. Ransdell.

The Maritime Association of the Port of New York
78 Broad St., New York City
President—Charles H. Potter.
Secretary—Walter F. Firth.

Lake Carriers' Association
Detroit, Mich.
Secretary—George A. Marr.

Neptune Association
21 Pearl St., New York City
Secretary-Treasurer—Captain John F. Milliken.

Ocean Association of Marine Engineers
15 Whitehall St., New York City
Secretary—Bert L. Todd.

CANADA

Grand Council N. A. of M. E. of Canada
Grand Secretary-Treasurer—Neil J. Morrison. Box 886, St. John, N. B.

GREAT BRITAIN

Institution of Naval Architects
5 Adelphi Terrace, London, W. C.

Institution of Engineers and Shipbuilders in Scotland
39 Elmbank Crescent, Glasgow.

Northeast Coast Institution of Engineers and Shipbuilders
Bolbec Hall, Westgate Road, Newcastle-on-Tyne

Institute of Marine Engineers, Incorporated
The Minories, Tower Hill, London.

ITALY

Collegio Degli Ingegneri Naval e Meccanici in Italia

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